AN HBJ PUBLICATION

MARCH 1984 / $2.00

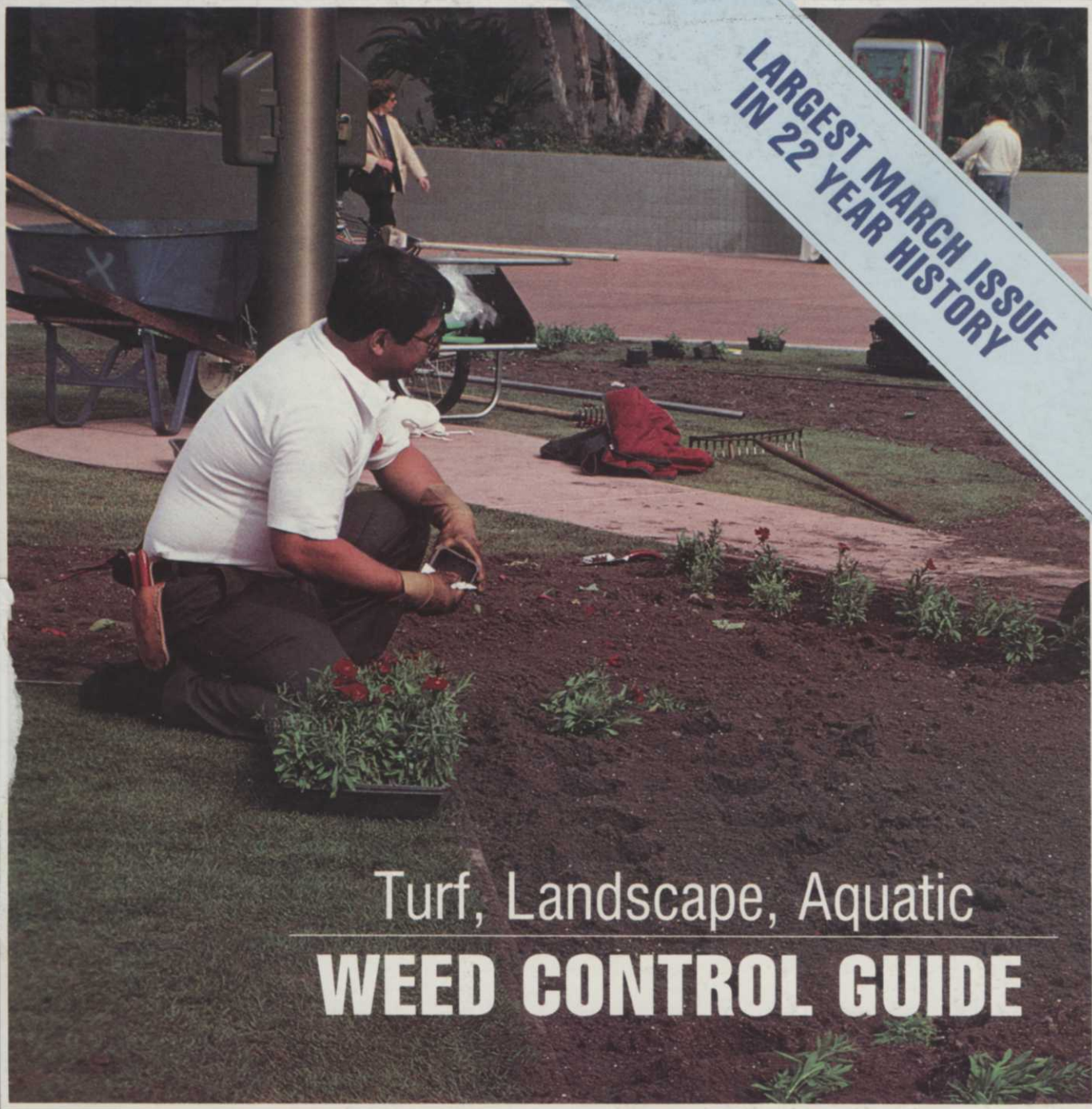
WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

New Device Simplifies Sprayer Calibration

Weed Control Guide, Now Includes Roadside and Aquatics

Planning and Managing Bedding Plants in the Landscape



Epcot Center crew changing annual display, Orlando, Florida.

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3918

Circle No. 117 on Reader Inquiry Card

MARCH 1984 VOLUME 23, NUMBER 3

WEEDS TREES & TURF

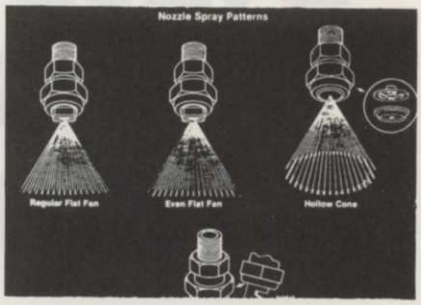
The Magazine of Landscape and Golf Course Management Since 1962

35 1984 Edition of the WEED CONTROL GUIDE

Updated and expanded, this valuable reference now has roadside and aquatic weed control sections in addition to turf and landscape sections. You'll want to save this reference for all your questions about weed control methods and suppliers.

98 Green Speed: Pushing Turfgrass To the Limit

Private clubs are leaning on superintendents to speed up greens to tournament pace. Superintendents, university specialists, and USGA Green Section staff give their opinions on the risks versus the benefits of fast greens.



102 Simplified Calibration of Boom Sprayers

A hand-held meter can provide nozzle outputs in an instant. Michigan State University Assistant Professor Bruce Branham also provides tips on checking spray pattern overlap and nozzle wear.

106 Practical Guide To Flowers and Design

Design flower beds now and place your order ahead of time. Use this guide to find low maintenance or improved types of bedding plants.

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Your search for a high capacity mower encompassing a one man operation is now concluded. The Hydro-Power 180 with it's 15 foot hydraulically driven rotary mower has a mowing capacity of up to 11 acres an hour while incorporating rear wheel steering for maximum maneuverability. Cutting units are designed for maximum floatation and may be used individually or in any combination of the three. There is a 2-range hydrostatic transmission which affords mowing speed as well as transport speed to insure minimum travel time between the job sites. The Hydro-Power 180 offers year-round versatility with a 2-stage 66" snow blower and heated cab.

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It works.

Preventive or curative applications of BAYLETON give grass the guts to resist dollar spot, copper spot, powdery mildew, red thread, and rusts. Preventive applications of BAYLETON will effectively control anthracnose/*Poa annua* decline, stripe smut, Fusarium blight, Fusarium patch, plus pink and gray snow mold. Control lasts up to 30 days or longer, depending on environmental conditions. Use it on greens by

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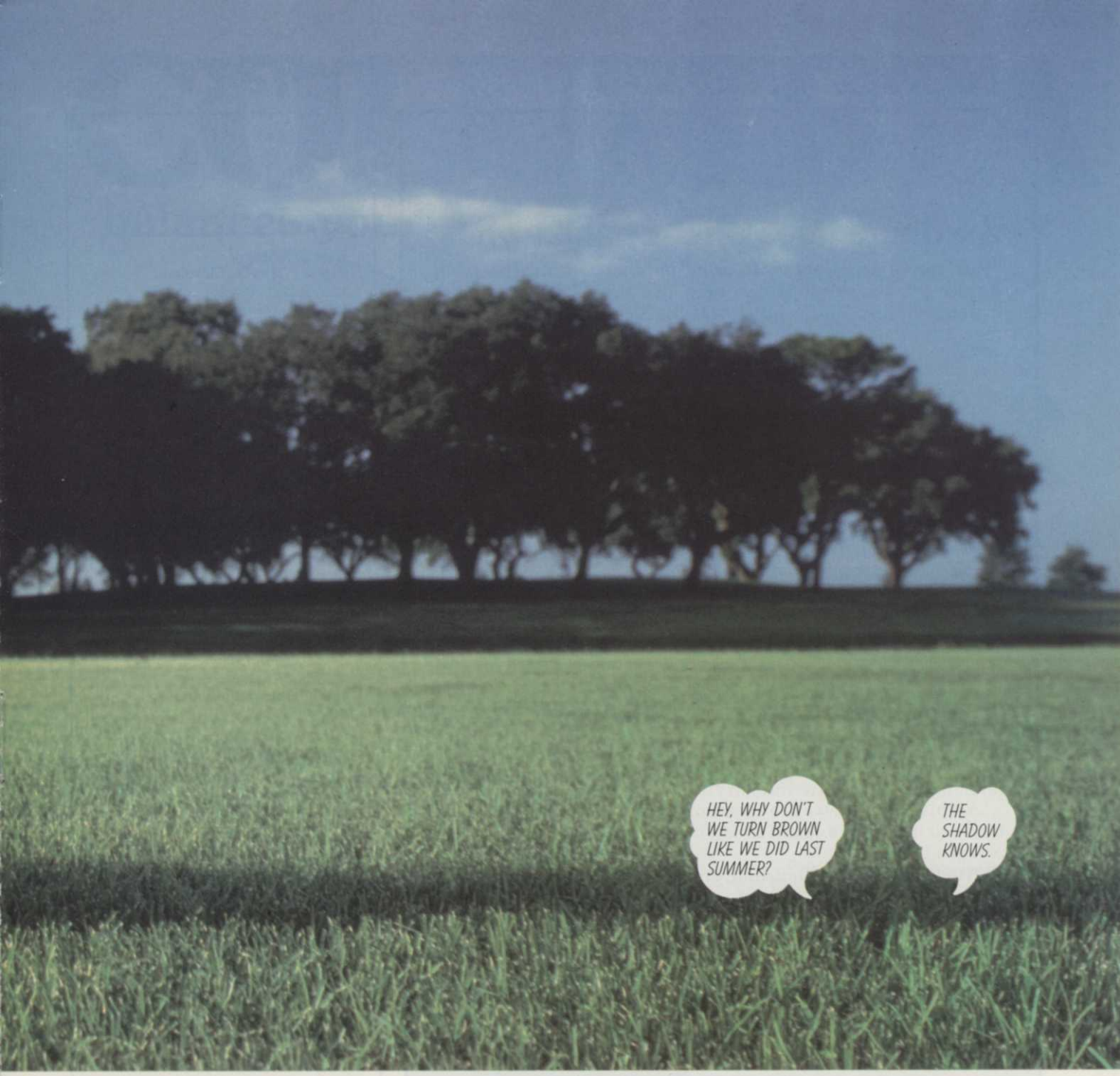

TURF'S GREEN BEAUTY FROM TURNING INTO BROWN UGLY.

all means—and fairways, too. With its lasting residual action, it provides the most cost effective control for summer diseases.

BAYLETON works so well for so long because it gives you systemic activity through both foliar and root uptake. Use recommended rates and follow label directions.

BAYLETON Turf fungicide. It can prevent your turf's green beauty from turning into brown ugly. See your turf chemicals distributor.

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Na-Churs goes after ChemLawn

"Our corporate objective is to be number two (in the lawn service industry) within the next five years," Peter Moore, manager of lawn and garden care for Na-Churs boldly stated recently.

Na-Churs, a fertilizer manufacturer, will launch four branches in Ohio this summer. The company is based in Marion, OH. ChemLawn, number one, is based in Columbus, OH.

That seems like a pretty tough goal, to approach ChemLawn's $180 million plus in lawn care within five years, especially when existing companies are closer in sales and going full speed, including Lawn Doctor, Ever-Green, and Tru-Green.

It's not the first time a manufacturer attempted the market. Barefoot was owned at different times by O.M. Scott and The Toro Co. Sears tried lawn care for two years and backed out.

The question is, can a manufacturer or supplier manage a service company? Were Scotts and Toro premature with Barefoot? Did Sears give up too quickly?

Na-Churs thinks it has the twist to make it happen.

1984 will be lawn care year

The excitement in the Green Industry this year will be centered on the lawn care industry.

At this moment, we are aware of at least six large companies ready to invest or expand in lawn care. One is British and the rest are U.S.-based.

We can't tell you the British company yet, but it makes you think of the opera.

The U.S. companies include Na-Churs and True Value hardware. Two other diversified companies are ready to jump in and two mid-size lawn care companies are preparing to go public.

We expect a great deal to happen in the next few weeks. We'll tell you as soon as we can.

Industry suppliers hire celebrities

Arnold Palmer did such a good job for Loft's Seed Co. that The Toro Company has hired him to help promote its products. Maybe we'll soon see an 'Arnie' mower since Loft's introduced Palmer perennial ryegrass last year.

Estech already has Jack Nicklaus under contract for its Vigoro line and may use him for its Par-Ex professional fertilizer.

Sports celebrities help distinguish the professional turf market from agriculture. Roy Clark or Jerry Clouwer can't sell grass seed or mowers like they can ag products. It's a sign that turf is growing up and able to stand on its own, apart from agriculture.

WT&T

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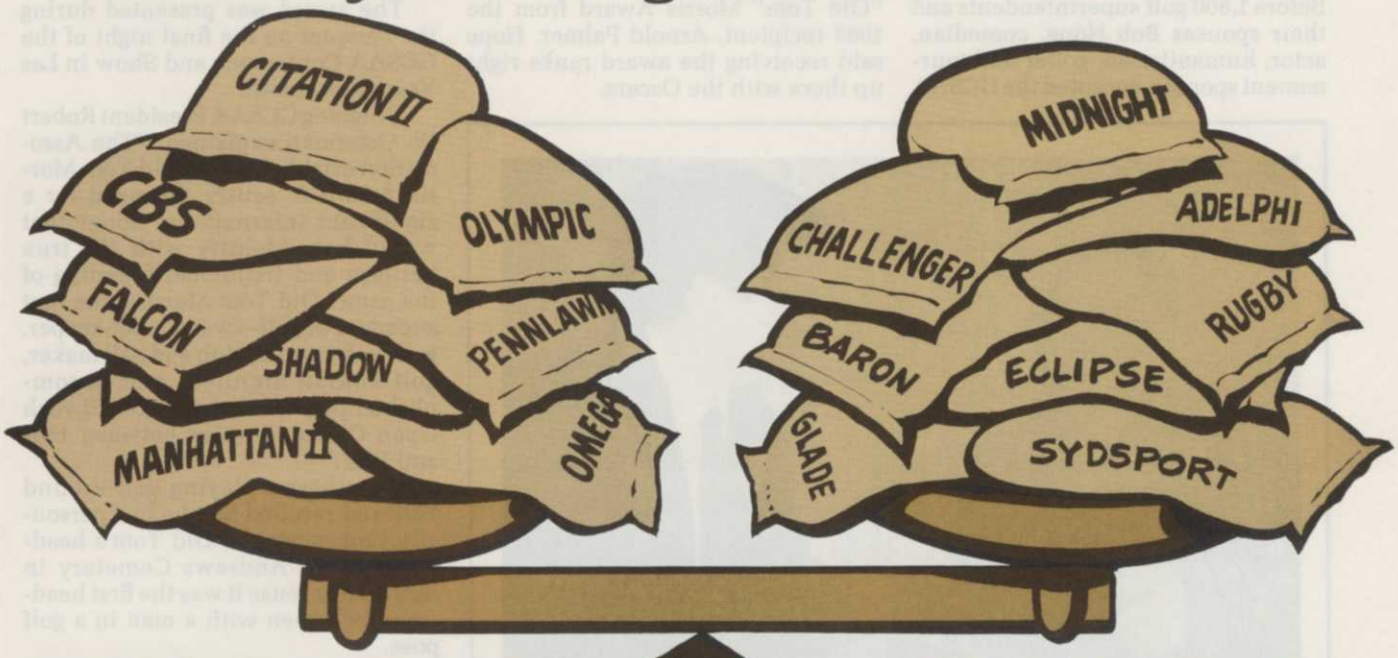

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Columbia is a consistent performer that has topped turf trials in Manhattan, Kansas; Hubbard, Oregon; Urbana, Illinois; and Santa Ana, Camarillo and San Jose, California.

Circle No. 174 on Reader Inquiry Card

GOLF

Hope says "Old Tom" Award good as Oscar

Before 1,800 golf superintendents and their spouses Bob Hope, comedian, actor, humanitarian, golfer and tournament sponsor, accepted the GCSAA "Old Tom" Morris Award from the 1983 recipient, Arnold Palmer. Hope said receiving the award ranks right up there with the Oscars.

The award was presented during the banquet on the final night of the GCSAA Conference and Show in Las Vegas last month.

Outgoing GCSAA President Robert W. Osterman explained, "The Association established the Old Tom Morris Award to satisfy the need for a significant international honor that would help identify with the true heritage and traditional founding of the game. Old Tom Morris—the first superstar of golf—was a greenkeeper, golf professional, club and ball maker, golf course architect and accomplished player who won four British Open Championships between 1861 and 1867."

Hope began playing golf around 1927 and recalled that he had personally shot movies of Old Tom's headstone in St. Andrews Cemetery in Scotland because it was the first headstone he's seen with a man in a golf pose.

Osterman said that besides being a superstar in his own time, much like Old Tom, Bob Hope has displayed a continuing, selfless commitment to golf and further the welfare of the game in a manner similar to that of Old Tom.

"Bob Hope's promotion of the game around the world provides highly visible evidence of his commitment to the game and its continued welfare," Osterman commented.

Grau is third WT&T Man-of-the-Year

Fred V. Grau received the third annual Man-of-the-Year Award from Executive Editor Bruce Shank during the GCSAA Show in Las Vegas. Grau's accomplishments extend to the 1930's when he discovered Penngift Crown Vetch and served as the first extension agronomist for turf in the U.S.

TURFGRASS

Penncross, Penneagle to ship Aug. 15

Tee-2-Green Corp. is planning an Aug. 15 shipping date for Penneagle and Penncross creeping bentgrass, if Mother Nature cooperates.

Bill Rose, speaking at a Tee-2-Green breakfast hosted at the Golf Course Superintendents Association of America in Las Vegas recently, said seed supplies are ample "if orders come in as they should and if it doesn't rain."

Last summer, seed fields in Oregon were inundated with 62 inches of rain, compared to the normal 40 inches, causing shortages.

"Right now (1984), we're planning bentgrass needs for 1986," Rose said.

Seed will be planted this spring for harvest in '85 and ready for course use in '86. An informal poll of attendees at the breakfast showed the need for bentgrass greater in 1986 than it is in 1984.

To help deal with the poor crop last summer, Tee-2-Green developed Pennway, a non-certified blend of Penncross and Penneagle. Rose said the company will continue developing Pennway into a certified variety.

EQUIPMENT

Equipment Expo endorsements grow

The Engine Services Association and the Outdoor Power Equipment Distributors Association have voted to endorse the International Lawn, Garden & Power Equipment Expo.

Speaking on the endorsement, Gary Merrill, OPEDA president, said, "Our members enthusiastically support this international event and we are looking forward to working with our supplier partners."

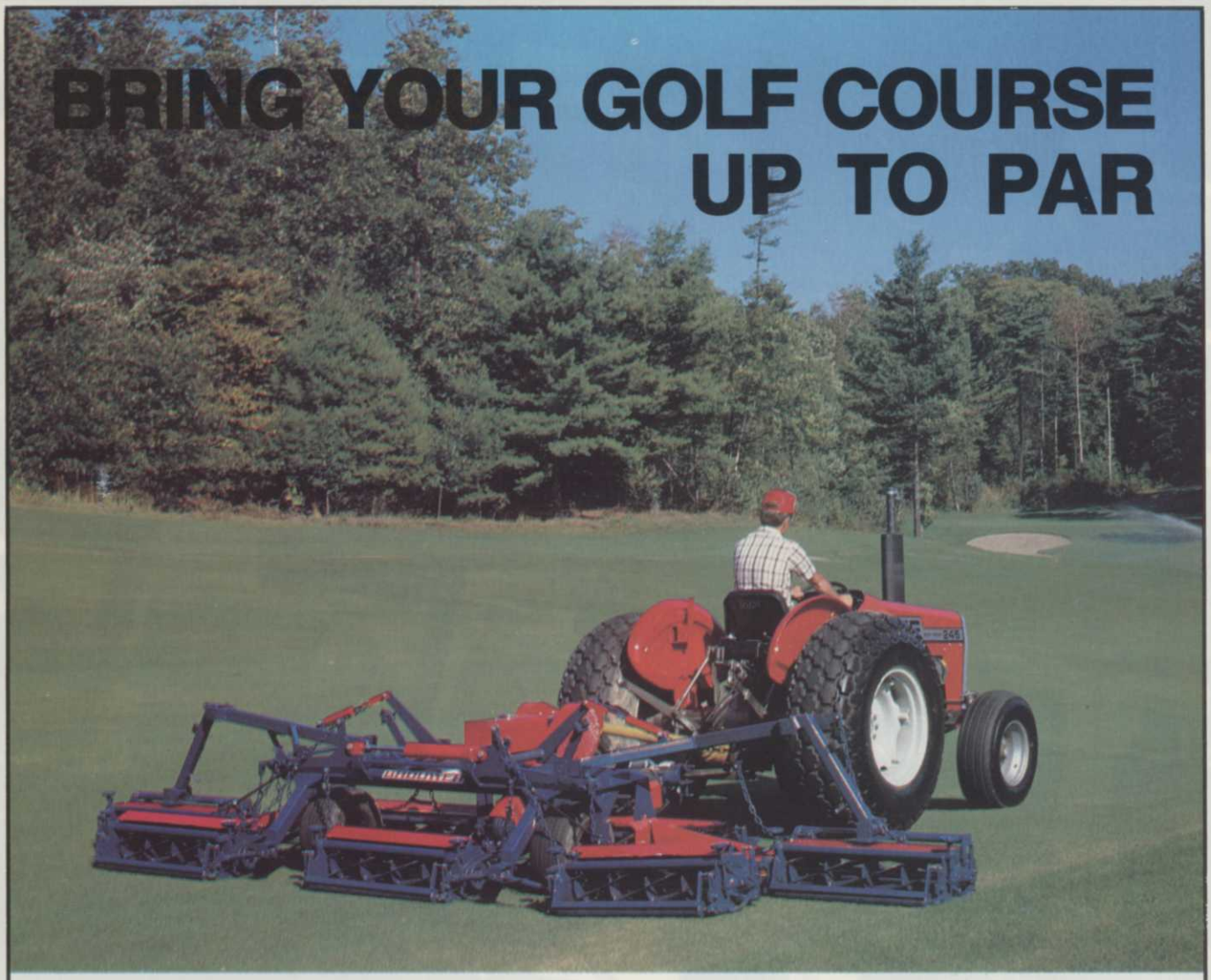
ESA's Bill Rousar, commenting on the show said the unique opportunities the event offers played a major role in their decision.

"Our members feel that the Louisville show will bring the industry together in one location where not only will we see the products exhibited, but we will have the opportunity to see them in actual operation."

Both groups plan major meetings during the show and will co-sponsor and coordinate several industry seminars.

The show is scheduled for July 23-25 at the Kentucky Fair & Exposition Center in Louisville, KY. Information can be obtained by contacting show management at PO Box 37130, Louisville, KY, 40233, (502) 366-9592.

BRING YOUR GOLF COURSE UP TO PAR



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- Designed to give your Golf Course a beautiful, consistent cut.
- Simple "No Wheel and Gear Drive" prevents tracks.
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- Economical to buy at 1/3 the price of self propelled mowers.
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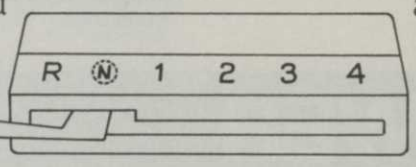
Introducing a mower that won't break down every few yards.

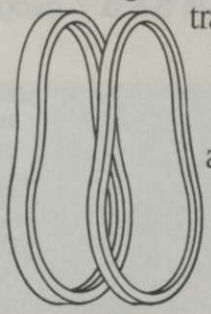
The problem with most mowers is they spend too much time in the shop and not enough time on the job.



You won't find that with Toro's new 36″ and 52″ commercial walk rotary mowers. Because we build them with the same durability we build in our commercial riding mowers.

For instance, we gave them an actual 4-speed transmission with neutral and reverse. So they won't lock into a single speed like some variable speed pulley systems.

And, knowing the continual problems you have with belts breaking, we added a much wider traction belt that's designed to last the life of the machine. We also eliminated an idler pulley on the deck drive belt, to make it last longer, too.



Even the

cutting spindles are engineered and protected to better withstand the shocks and jolts of everyday cutting.

While we were making our new commercial mowers tougher, we decided to make them more productive, as well.

We gave them a floating deck, same as our Groundsmasters®, so they'll follow the contours of the terrain while minimizing scalping.

We made it possible to change the height of cut in a minute by simply moving four pins.

And we came up with a new steering design that makes it easier to maneuver around trees, shrubs and other obstacles. You simply push the steering bar to mow, and release it to stop.

If our commercial walk rotary mowers are beginning to sound like no other walk rotary mowers you've ever seen maybe it's because they are. Visit your Toro distributor soon. He can fill you in on all the details.

Whichever one you choose, it'll keep you cutting yard after yard, year after year.

TORO®

The professionals that keep you cutting.

Circle No. 172 on Reader Inquiry Card

UPDATE

USGA begins building expansions

The United States Golf Association has announced plans to build two buildings adjacent to Golf House, the USGA headquarters in Far Hills, NJ.

The association will build an office building and a test facility next to its present headquarters, according to USGA. The price tag will be around $5 million.

The two buildings will house approximately 85 USGA staff members. Golf House, which now includes administrative offices will be devoted entirely to the USGA museum and library.

The new office building on the 62-acre site will be a three-level structure with approximately 38,000 square feet of space. The test building will have about 7,000 square feet of space.

Hueber returns as NGF president

In 1977, David Hueber was a hospital administrator in Memphis, TN. He had studied for six years at Florida State and Memphis State to become a hospital administrator. But, he had also played outstanding golf at both institutions. The walls of the hospital must have seemed like bars.

Deciding golf meant too much to him to leave behind, he accepted a field service position with the National Golf Foundation. After three years he moved to the PGA as marketing representative and worked his way up the ladder to vice president of PGA Tour Properties.

In February, Hueber assumed a position 60 others had tried to get, president of NGF. At 32-years-of-age, he seems young for the job. But then, he has an MBA, he has been champion of the Tournament Players Club at Ponte Verde, FL, the past two years, and he has seven years of management experience in golf organizations.

NGF Chairman Joe Phillips said, "He impressed us with his thoughts on how to move the Foundation forward. He is an absolutely bright, young talent."

GCSAA Vegas show was flawless

Yes, Bob Hope did attend the banquet at the GCSAA Show in Las Vegas to receive the "Old Tom" Morris Award from Arnold Palmer. And yes, a record number of superintendents from around the country attended the educational sessions and explored the exhibits despite the lure of gambling. GCSAA pulled it off.

As Robert Osterman stepped down as president of GCSAA after one of its most challenging years, he had to feel both a sense of relief and accomplishment. He managed the group through a change of executive director, a law suit, restaffing, and financial audits. But, just like the conference, he, the executive committee, and the GCSAA staff pulled it off.

GCSAA had a triple bypass last year, and Osterman was the chief surgeon. The operation was apparently a success.

CHEMICALS

"Chemical insanity" defense in murder

In the first legal case of its kind and one that will send a stinging aftershock through the chemical industry, a former employee of a Massachusetts lawn care company is alleging chemicals he used on the job caused him to become insane and drove him to murder a 34-year-old woman.

David Garabedian, 23, formerly employed by Old Fox Lawn Service of Chelmsford, MA, is being tried in the bludgeoning-strangulation slaying of a former customer after she chided him for urinating in her yard.

His defense attorney contends Garabedian's mind snapped and was "twisted" from chemicals he used on the job and likened the mental condition of his client at the time of the slaying to that of "someone on drugs or alcohol."

Richard Gillette, manager of Old Fox Lawn Service, was quoted as saying that there was no documented evidence that anyone has ever committed murder while "under the influence" of lawn care chemicals.

The outcome of Garabedian's trial could have far-reaching implications in the chemical industry, however. The case may be the breeding ground for a new legal precedent for other workers in the chemical industry — chemical insanity as a defense plea.

DISEASES

Zontek says conditions perfect for snow mold

Stanley Zontek, north central regional director for the United States Golf Association Green Section, says conditions in his region this winter are perfect for snow mold.

"The ground was not frozen in many areas when the snow covered it this winter," said Zontek. "Continuous snow cover means conditions are perfect for snow mold development."

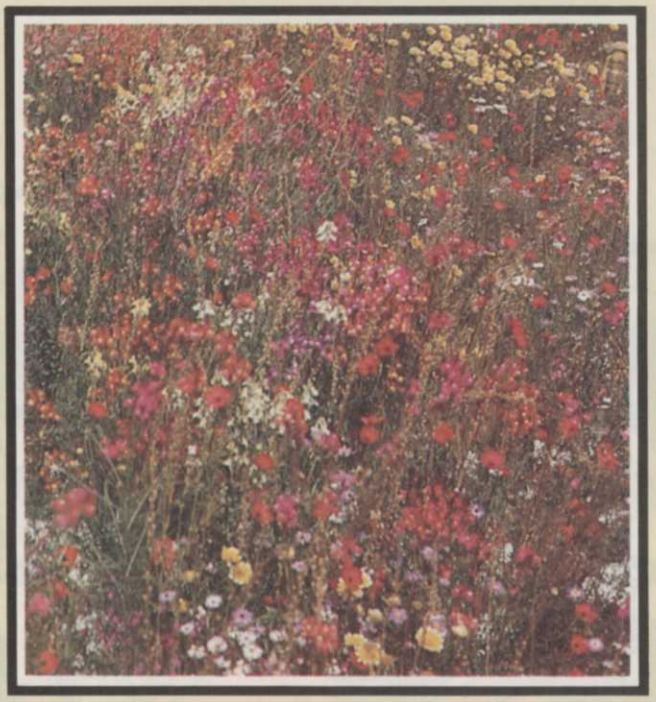
continued on page 18

Correction

In the December 1983 issue, iron chlorosis on an oak leaf pictured on page 37 was inadvertently misidentified. A number of readers brought this to the editors' attention. We regret any confusion.

—The Editors

Create a Colorful Difference



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the colorful and decorative answer for low maintenance landscape areas.

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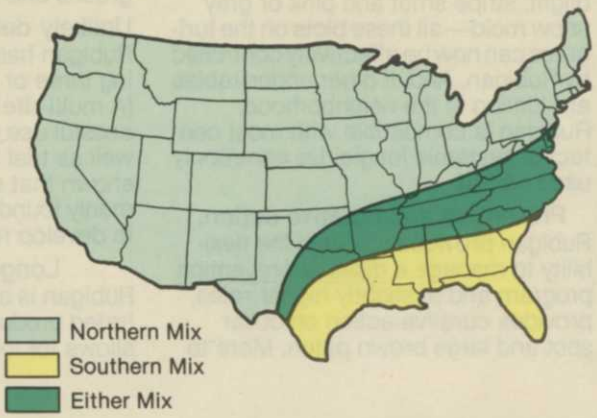
Pinto is ideal for any landscape — parks, roadsides, golf course roughs, home gardens, industrial and landfill sites. And perfect for areas where you don't have to mow.

Available either as 100% wild flowers, or mixed with a fescue as a Meadow Mix to aid soil stability.

It's custom blended in a Northern or Southern mix. So wherever you live, your Pinto order will be perfectly adapted for your climate. It will make this year the start of many colorful years to come.

Pinto Wild Flower Mix: the easy, low-maintenance way to naturalize your surroundings.



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- **John Sours or Grant Jurgensen of Jacklin Seed Company (800) 635-8726**

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Unwanted, unloved, unwarranted. So the logical course of action is to evict these tenants before they call your turf their own.

Broad spectrum control. Dollar spot (even fungicide resistant strains), large brown patch, fusarium blight, stripe smut and pink or gray snow mold—all these blots on the turfgrass can now be effectively controlled by Rubigan. And, if other undesirables are lurking in the neighborhood, Rubigan is compatible with most contact or systemic fungicides commonly used on turf.

Preventive and curative action. Rubigan provides you with the flexibility to manage a disease prevention program and at slightly higher rates, provides curative action on dollar spot and large brown patch. More to the point, Rubigan acts as an enforcer that prevents turf diseases from making themselves feel at home on tees, greens and fairways.

Unlikely development of resistance. Rubigan has a mode of action involving three or more sites of inhibition. (A multi-site inhibitor.) Years of successful use outside of the U.S., as well as trial usage in the U.S., have shown that susceptible fungi commonly found in turf have not been able to develop resistance to Rubigan.

Longer-lasting control. Rubigan is a very active, concentrated product. Long lasting control allows for longer intervals between spraying. You can reduce the number of application trips and save on fuel and labor costs. What's more, lower use rates mean less storage and lower handling costs.

Rapid leaf penetration. Rubigan is a foliar-applied, locally systemic fungicide. It is absorbed almost immediately into leaf tissue and is not susceptible to washoff by rainfall or irrigation once the spray has dried. While the spray is drying, the active ingredient sets up shop inside the plant where it can't be washed out. Disease protection begins immediately after application.

Excellent turfgrass safety. No adverse effects or discoloration occurs when Rubigan is used at

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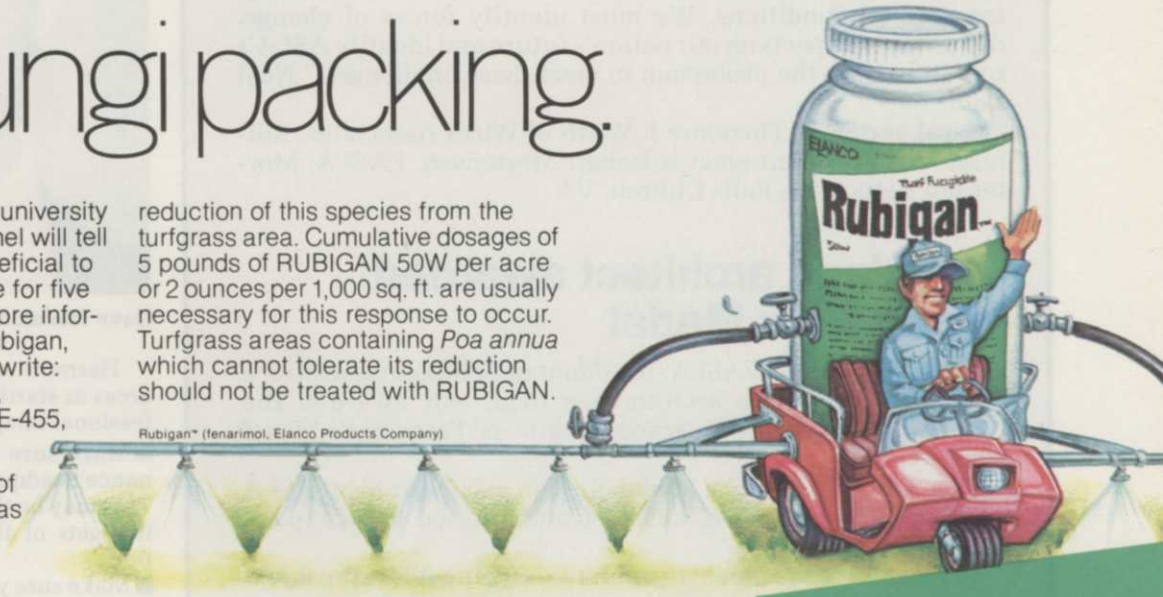
riddance.

turf fungi packing.

recommended rates. Your university turfgrass research personnel will tell you that Rubigan is as beneficial to your turf as it is destructive for five major turf diseases. For more information on cost-efficient Rubigan, contact your distributor or write: Elanco Products Company, 740 S. Alabama St., Dept. E-455, Indianapolis, IN 46285.

Precautions: Applications of RUBIGAN to turfgrass areas containing *Poa annua* (annual bluegrass) may result in the gradual reduction of this species from the turfgrass area. Cumulative dosages of 5 pounds of RUBIGAN 50W per acre or 2 ounces per 1,000 sq. ft. are usually necessary for this response to occur. Turfgrass areas containing *Poa annua* which cannot tolerate its reduction should not be treated with RUBIGAN.

Rubigan™ (fenarimol, Elanco Products Company)



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Circle No. 118 on Reader Inquiry Card

UPDATE

First woman ASLA president named

Darwina L. Neal, FASLA, a senior landscape architect with the National Park Service in Washington, D.C., was installed as the new president of the American Society of Landscape Architects at the 1983 Annual Meeting recently. She is the first woman president of the organization, succeeding 35 consecutive male presidents.

Neal's goal is to stress the need to strengthen the role of landscape architects in influencing public decision-making to ensure full consideration of environmental issues.

Darwina Neal and Theodore J. Wirth

"No longer can landscape architects merely react to changing societal conditions. We must identify forces of change, define their impacts on our nation's future and identify ASLA's role in leading the profession to meet these challenges," Neal said.

Neal succeeds Theodore J. Wirth of Wirth Associates, Billings, MT. President-elect is Robert Mortensen, FASLA, Mortensen Associates, Falls Church, VA.

Cleveland architect awarded President's Medal

William A. Behnke, FASLA, president of Behnke Associates, a Cleveland landscape architecture firm, was awarded the American Society of Landscape Architects' President's Medal recently.

The ASLA President's Medal is given each year to an ASLA member in recognition of unselfish and devoted service to the national society.

In presenting the medal to Behnke, outgoing ASLA president Theodore J. Wirth said, "Bill's dedication to the advancement of the profession and the Society has been a continual inspiration to us all. This award is offered in special recognition of his outstanding accomplishments, which have contributed greatly to the growth of ASLA over the last decade."

A past national president of ASLA, Behnke has served on most major committees of the professional association and was elected a Fellow in 1975.

SNOW MOLD *from page 14*

Zontek also said covering greens to obtain early green-up may further encourage snow mold development.

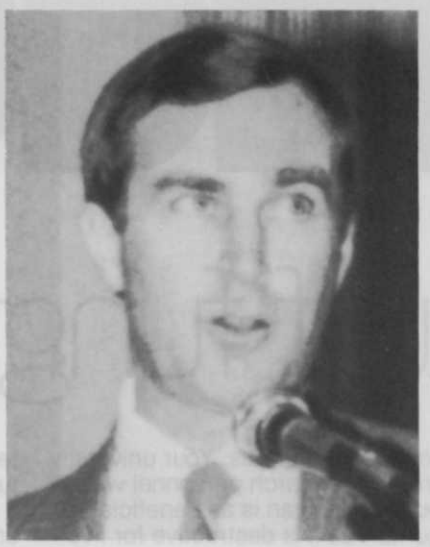
GOLF

8 tips for supers to increase professionalism

Professionalism is an elusive attribute.

Dave Harmon, superintendent at the Golden Horsehoe Golf Club in Williamsburg, VA, outlined some suggestions for increased professionalism for golf course superintendents at the recent Virginia Turfgrass Association Convention in that city.

"We (superintendents) are as much professionals as doctors and lawyers," he said. "People put faith in our advice."



Dave Harmon

Harmon suggested the following areas as starting points to a more professional image:

- Make sure the lane to the maintenance headquarters is clean and neat. This may be the first impression a visitor gets of the maintenance operation.
- Make sure your clothes are neat and clean and wear a shirt with the club's monogram on it.
- Organize your office files.
- Foster a good relationship with your golf pro. Initiate a weekly round of golf or lunch to get to know each other.
- Make sure you take the time to train your crew properly. Encourage employees to attend special schools

continued on page 20

Subdue. The most effective fungicide against Pythium blight and damping-off.

Pythium weather. High temperatures, high humidity and high anxiety. Once Pythium takes root, it can destroy turf within hours.

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Subdue works both on contact and systemically.

Subdue fights Pythium blight and damping-off—as well as downy mildew (yellow tuft)—in two ways. On contact, Subdue destroys the fungi in the soil. Systemically, Subdue prevents disease from within grass plants. That's because Subdue is water soluble—easily absorbed by roots. So Pythium—and now, downy mildew—don't have a chance.

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Subdue's systemic action means longer, more effective residual protection. Fewer applications. Lower chemical costs. And savings in maintenance and labor. And Subdue's low application rate—1 to 2 fluid oz. per 1,000 sq. ft. for 10 to 21 days on established turf—makes Subdue the most cost-efficient protection you can buy.

Before Pythium weather strikes, subdue it. Use Subdue in a preventive maintenance control program. And get a good night's sleep.

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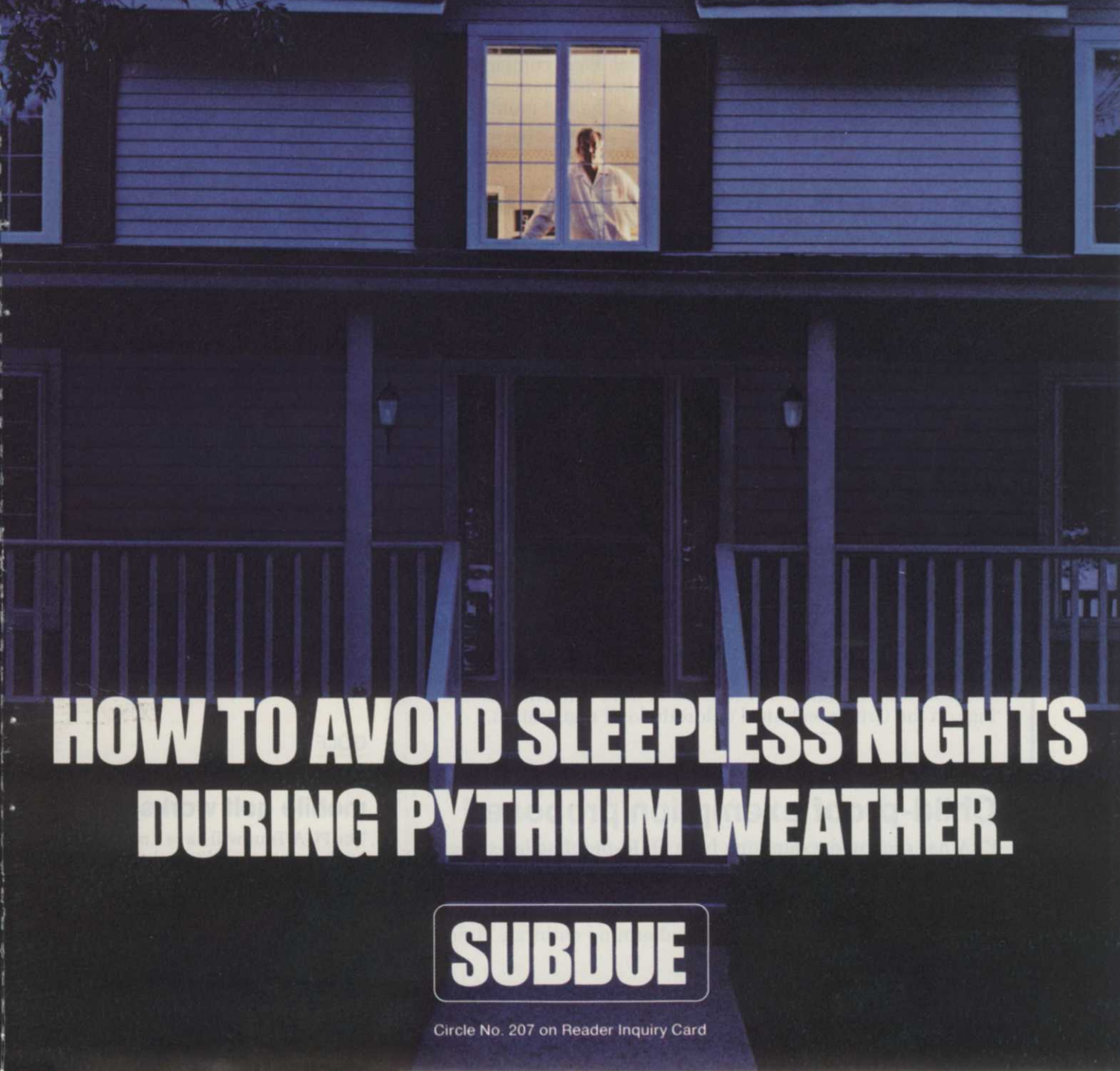


HOW TO AVOID SLEEPLESS NIGHTS DURING PYTHIUM WEATHER.

SUBDUE

Circle No. 207 on Reader Inquiry Card

GOVERNMENT UPDATE

USDA changes lawn seed regs

The U.S. Department of Agriculture has amended the Federal Seed Act to give turf seed growers ten addditional months between germination testing and shipment.

Before the change, which took effect in February, seed companies had to ship seed within five months of germination tests. Since the growers convinced USDA certain grasses maintain germination qualities longer than previously thought, they now have 15 months after doing tests before they have to ship.

The change applies to bentgrass, Kentucky bluegrass, chewings fescue, hard fescue, red fescue, tall fescue, annual ryegrass and perennial ryegrass.

The Federal Seed Act is a truth in labeling law. It requires seed growers to provide information on the components and germination rates of the seed on the label. Each component of the seed mix must be listed in order of predominance and the oldest germination test must not be older than 15 months.

Briefs pour in for Monsanto case

The Who's Who of the chemical industry have lined up behind Monsanto in its Supreme Court case against EPA and Stauffer Chemical Co. by submitting amici curiae briefs to the Court in late January. Monsanto is suing EPA for allowing Stauffer to use safety data to support registration of a product similar to Roundup.

American Cyanamid, American Hoechst, BASF Wyandotte, Chevron, Ciba-Geigy, Dow, duPont, Elanco, ICI Americas, MoBay, PBI Gordon, Rhone Poulenc, Rohm & Haas, SDS Biotech, Union Carbide, Uniroyal and Zoecon have all told the Court that they side with Monsanto. Stauffer filed its own brief telling the Court that FIFRA never adequately provided just compensation for data developers and that registrations acquired under the existing law should not be retroactively nullified.

Monsanto and the other chemical companies contend data required for registration are "trade secrets" and not the property of EPA once submitted.

Meanwhile, SDS Biotech has asked EPA to cancel a registration for chlorothalonil(Daconil 2787) by Griffin Corporation saying it never gave and never will give Griffin permission to use SDS Biotech data. EPA intends to hold cancellation hearings on the Griffin technical chlorothalonil registration.

Child-proof exemption proposed

EPA has proposed exempting from child-proofing laws insecticide containers greater than one gallon or 40 pounds and herbicide and fungicide containers larger than five gallons or 75 pounds. EPA said containers in these sizes are used by commercial users and are not stored around children. A final ruling is due this month.

HARMON *from page 18*

and courses. And don't neglect your own continuing education.

- Set up a viable purchasing system and inventory control. Send out bid lists to track down the best deal on all supplies.
- Keep course equipment in good working order and have an equipment inventory.
- When you have a problem or need advice, ask for it. A true pro will never hesitate to ask for help. When someone comes to you for help, give it freely and willingly. Get to know your county extension agent. They can become valuable friends.

PEST CONTROL

Ecogen is new bio pesticide company

A new company has sprouted in the field of biological pest controls.

Ecogen Inc. is focusing on microbial and viral pesticide products derived from the latest advances in biotechnolgy. The company will also be involved in the development of specialty pest control products with applications in agriculture, forestry and households.

The company will also be involved in the development of specialty pest control products with applications in agriculture, forestry and households.

John E. Davies is president and chief executive officer, formerly senior vice president and general manager of the Agrochemical Division of Rhone-Poulenc, Inc.

Bruce C. Carlton, Ph.D is vice president of research and development. He is a professor of molecular and population genetics at the University of Georgia, Athens. Harold V. Smith is Chairman of the Board.

Ecogen Inc. was founded by Johnston Associates, Inc., Princeton, NJ.

GOLF

PGA Tour OKs mobile golf workshop

The PGA Tour will have a mobile golf workshop that will travel with it the entire season, logging about 100,000 miles.

The mobile unit is the brainstorm of Mizuno Golf Company USA, the American marketing arm of Mizuno Corporation, headquartered in Osaka, Japan.

There's a new club pro in town.

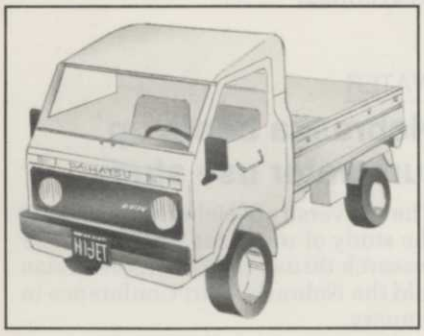
The amazing Daihatsu HI-JET!

Inch for inch, and dollar for dollar, the Daihatsu (di-hot-sue) is in a class by itself. For lots of reasons.

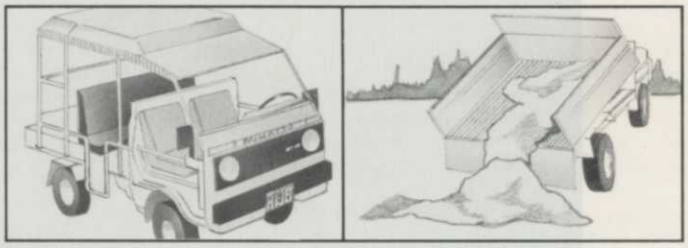
First off, it's **not** a converted golf cart, or made-over anything else.

The Daihatsu is exactly what it was designed and built to be. The closest thing yet to the perfect off-road vehicle for hauling, for seeding, for aereating, for top dressing and spraying. For whatever it takes to maintain your golf course.

The Daihatsu can haul up to 1,000 pounds of just about anything. And even when it's empty, it's loaded — with all the built-to-last features you want and need (and should demand) in an off-road vehicle.



For instance, standard equipment includes everything from side mirrors, horn, and a full complement of visual instruments to seat belts, spare tire, and jack.



Optional equipment. Impressive. And useful.

- Fiberglass cab with windshield
- tow hitch
- heater
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- electric hydraulic dump box
- people mover
- and more.

That's about the size of it except for the size of it. The Daihatsu HI-JET is compact. Really compact. Only 125.8 inches long, 54.9 inches wide, 48.4 inches high. But it makes every inch count. And every dollar.

As good as the Daihatsu HI-JET sounds (and performs) you probably think it's expensive. It's not. It actually costs **less** than competition, which means it has no competition.

Write or call John Gidcumb for complete information, and the name of your nearest dealer.

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Remember the name because you're going to hear a lot about it. Fylking Kentucky bluegrass lawn is something special. It forms a dense, thick turf, more disease and drought resistant. Greens up earlier, stays greener longer. Fylking can be cut as low as ¾ inch, even ½ inch for home putting greens. Proven over many years of international certified testing. Ask your seed distributor for Fylking.

Fylking — the World's Fair grass.

FYLKING
KENTUCKY BLUEGRASS
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Another fine, quality-controlled product of Jacklin Seed Company.

Circle No. 130 on Reader Inquiry Card

Tsutomu Nishiyama, *left, Shoju Ono and Tates Locke in Mizuno's mobile golf workshop.*

The workshop is manned by Shoju Ono and Tsutomu Nishiyama, two Japanese craftsmen from the Custom Club Department of Mizuno's parent firm in Gifu, Japan. Tates Locke, a former head basketball coach, is the unit coordinator. The workshop is able to provide immediate on-site club repair and modification to the individual specifications of professional players. Specific services include repair of damaged heads, shafts and grips as well as such club modifications as loft, lie, weight distribution and shaft frequency. Replacement components are manufactured by Mizuno as well as other leading golf manufacturers.

Jack Curran, president of Mizuno Golf Company USA, said the mobile workshop, an exclusive service approved by PGA Tour headquarters, will concentrate on the men's tour but will also appear at selected stops on the Seniors Tour as well as the LPGA circuit.

"We believe this demonstration of Mizuno's craftsmanship is an excellent way to reinforce the company's commitment to serious golfers in this country," Curran said.

Mizuno Corporation, founded in 1906, is the largest golf company in the world. Last year, world-wide sales for all Mizuno's sporting goods exceeded $500 million.

WATER

Nebraska beefs up turf water use study

The University of Nebraska is making the study of water use by turf a major research thrust, Dr. Robert Shearman told the Nebraska Turf Conference in January.

Shearman, associate professor in

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Proxol's fast action lets you program for grub control. When you need it. Where you need it. There's no need to treat your entire acreage. But when grub problems arise, you can spray affected areas for fast Proxol control at an economical cost. As an added convenience, you can even mix Proxol with other non-alkaline chemicals.

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Proxol kills grubs and surface feeders. Fast!

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Circle No. 131 on Reader Inquiry Card

turf at Nebraska, said five graduate students are now working on the subject. They are studying water use by turfgrass type, turf vigor under various amounts of irrigation, and water use efficiency.

Nebraska depends largely on wells for water and the state has created laws to prevent uncontrolled depletion of water tables.

The research will help turf managers in many other states with water limitations. Some states have even restricted the use of certain types of turfgrass, such as Kentucky bluegrass, because they are considered water wasters.

Shearman said turfgrasses use less than two percent of the water applied to them. Heat, excess nitrogen, mowing, traffic, and soil greatly effect water use by turfgrass plants.

Another speaker at the conference, Dr. Bill Meyer of Turf Seed Inc., Hubbard, OR, told the Nebraskans that the recently discovered endophytes in perennial ryegrass, seem to improve drought tolerance. Meyer said Dr. Reed Funk at Rutgers University, New Jersey, has shown increased drought tolerance in test plots.

ASSOCIATIONS

Michigan goes on TV to tell about turf

Three videotape programs about turf were shown for the first time during the Michigan Turf Conference in Lansing in January. Gerald Faubel, president of the Michigan Turfgrass Foundation, said MTF provided a $30,000 grant to Michigan State University to develop and shoot the tapes.

"Copies of the tape will be sent to extension agents throughout the state and to local television stations upon request to describe the work of the Michigan Turfgrass Foundation and the many opportunities for students in turf occupations," Faubel told *Weeds Trees & Turf*. The grant supports work by two graduate students at MSU. Shawn McBurney, assistant to Dr. Paul Reike, writes the scripts while Christian McMillan, a graduate student in telecommunications, does the shooting and editing.

"When extension agents make a presentation to high schools or clubs, they now can have professional support material in the form of videotape," McBurney said. "We are especially proud of this first in turf," Faubel said. The tapes are extremely well done and professional.

For more information contact Jerry Faubel, 4465 Gratiot, Saginaw, MI 48603.

Estate Turf Spreader Model 700

$365.00
Freight Included

- Spread seed, fertilizer, lime, sand or de-icers
- Big 800 lb. capacity
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- Rugged Steel chassis with Polyethelene hopper
- Unique double-action drag chain prevents clogging while calibration is provided by 0 to 2½ sq. in opening

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Perfect for spraying fruit trees, shrubs, yards, or pastures.

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- Comes with hand held sprayer, and 10 ft. hose.
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- Lightweight, easy to store, (41 lbs.)

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(Add $72.00 for dump option) Freight Included

- 1-ton hauling capacity with hand operated hydraulic dump system
- Heavy structural steel frame
- Removable Side Racks
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- 5 ft., 6 ft. & 7 ft. beds available
- Also, single axle and tandem axle trailers available

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DENSE MAKES SENSE!

Manhattan II guarantees greener turf or greenbacks.

Breakthrough.

Manhattan II's astonishing density surpasses any other ryegrass you can buy.

Ten years of careful research and testing has resulted in a ryegrass that's so dense, it gives you up to 40% more green grass, seed for seed, compared to other turf-type ryegrasses. What does it mean for you? Read on!

Economical.

Manhattan II is not only beautiful, it's beautifully practical. Because of its unusual density, it actually crowds out weeds. So it needs less herbicides. And it cuts clean and sharp, with no frayed leaf tips.

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Manhattan II has very good resistance to Rhizoctonia brown patch, leaf spot, crown rust and stem rust. Add drought and heat tolerance and you've got a turfgrass that's tough and persistent.

Wears better, looks better, lasts longer! Super density does it!

This was the best you could get – until Manhattan II.

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If you don't agree that Manhattan II is everything we say it is: denser, greener and tougher than the ryegrass you're using now, we'll send you a check for $50.00. Ask for complete details.

Manhattan II

There's more to it.

Manhattan II sounds terrific:
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"There's no question that Dursban insecticides are one of the most versatile, safe, and dependable insecticides which modern chemistry has produced. The Andersons expertly incorporate Dursban into Tee Time fertilizer/insecticide combinations that also give turf pros the added benefit of simultaneous turf feeding. Now, that's effective, efficient and economical.

"What's more, The Andersons' new production facilities are computerized and state-of-the-art. That means accuracy and precision control of the formulation process which is critical to consistent product performance.

"We're confident that turf care pros looking for reliability in fertilizer/insecticide combination products can always find it in The Andersons' Tee Time products with Dursban."

David H. Naffziger

David H. Naffziger, M.S.
Product Development Manager,
Dursban Insecticides
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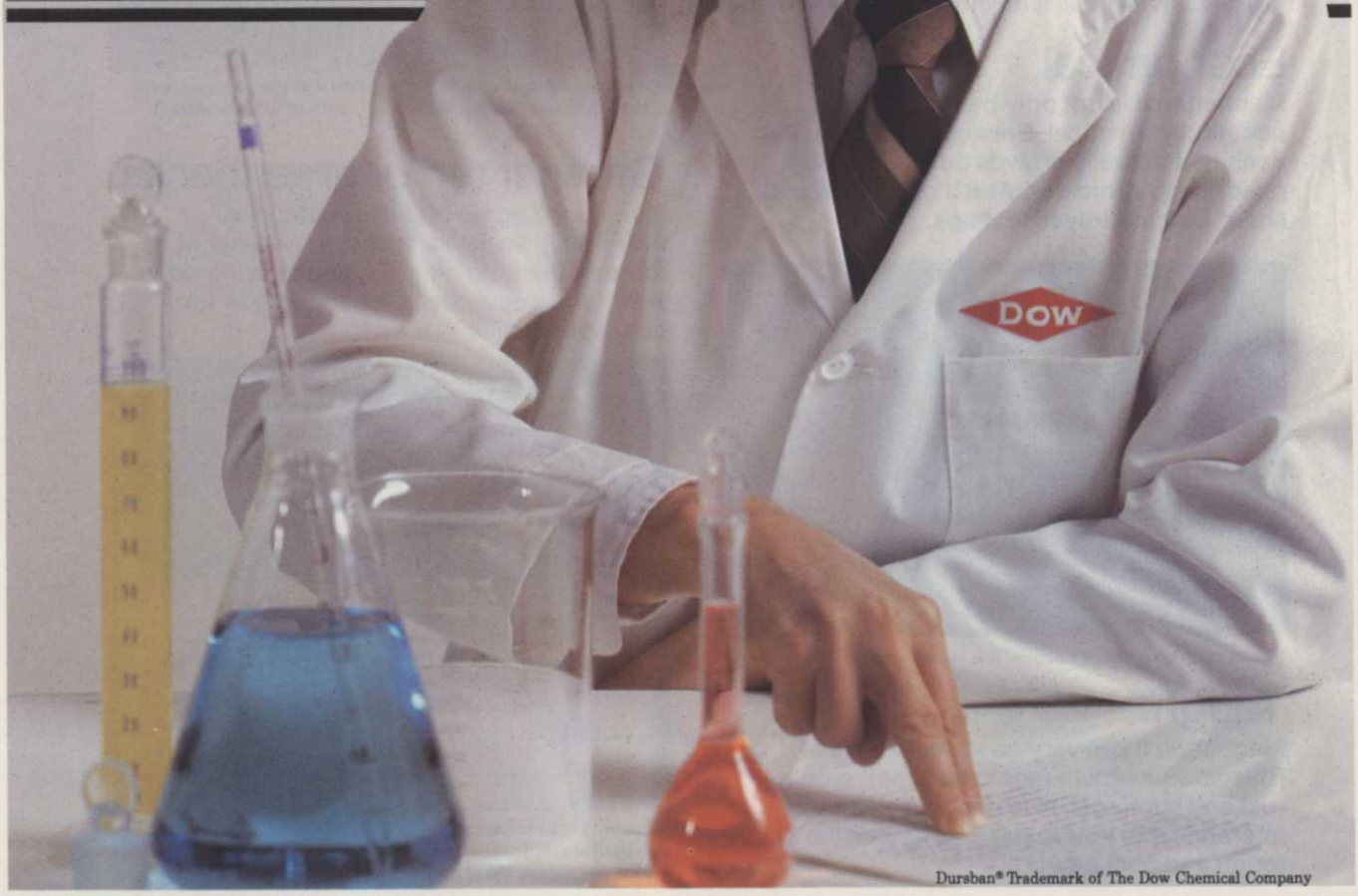

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DURSBAN® and TEE TIME™

The safe combination you can bank on to beat back bugs.

The investment you make—in time, labor, product and equipment costs—should not only pay-off with the most healthy looking turf possible—it should also yield other high-interest dividends such as repeat business, happy customer referrals and increased profitability.

That's precisely why more and more investment-wise turf care experts bank on Tee Time and Dursban insecticides.

Sod webworms, billbugs, chinch bugs, grubs, armyworms, chiggers, clover mites, crickets, ants, grasshoppers, mosquitoes, turf-grass weevils—they can all be formidable foes when it comes to unlocking the greatest possible return on your turf care investment. You need the kind of product performance security you get from The Andersons.

With The Andersons' line-up of high-quality Tee Time fertilizer/insecticide combinations *with* Dursban, you get all the selection flexibility you need to meet your specific insecticide requirements. What's more, you also earn the added economies of single application products that feed *while simultaneously* controlling bugs.

You can bank on Tee Time 30-3-5 *with* Dursban—38-0-0 and 18-3-5 *with* Dursban—Tee Time triple-action 20-4-10 *with* Dursban *and* Balan® for feeding, weeding, and insect control—and Tee Time straight formula Dursban 2.5G.

The Andersons purchases technical Dursban in large, economical bulk quantity. Then, it carefully and expertly incorporates it in its computerized state-of-the-art production facility. The result? Safe, consistent, accurate formulations—quality assured—and performance proven. Value to you that's right on the money.

For the best return on your turf care investment, rely on your close-by Tee Time distributor. He'll tell you more about the big dividends you earn when you bank on performance yielding Tee Time/Dursban combinations from The Andersons.

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Circle No. 101 on Reader Inquiry Card

Start the year in control

As April approaches, equipment should be in shape, clean-up and correction of winter damage complete, and preemergence weed control programs either in progress or ready to go. Furthermore, you are a step ahead of insects after dormant oil spraying and important trees and shrubs have been pruned and fertilized. You are ready for the busy season.

Snow Mold Control

Northern landscape managers have been warned by turf pathologists that snow mold conditions are perfect. Snow has covered much of the North for more than three months after a cool, wet fall.

Bentgrasses and Kentucky bluegrasses are more susceptible to both gray and pink snow mold than red fescue.

Gray snow mold afflicts turfgrass under snow cover. It appears in the spring as circular gray to straw-colored spots, six to twelve inches in diameter. When the snow melts the damage is already done. To have any effect, fungicide applications must be made before snowfall for gray snow mold.

Pink snow mold can occur without snow cover, just as long as conditions are cool and wet. Symptoms are reddish patches from one to eight inches wide.

Michigan State University Pathologist Dr. Joe Vargas warns that snow mold damage may seem small, but year after year it takes a cumulative toll and helps *Poa annua* encroach on bentgrass. "All you can do in the spring is try to warm up and dry out the soil surface and give the turf a shot of nitrogen to help it recover," says Vargas.

A preventative program of fungicide applications should be seriously considered for this fall if you had a problem this winter. There is growing evidence that spring diseases contribute to the severity of summer turf diseases. Also, research at Iowa State University has shown considerable leaf spot activity in the fall. Iowa State Pathologist Clinton Hodges recommends extending disease control programs into the winter.

Finally, there are indications fungicide rates can be lowered after the first few years of application with the same degree of control.

Turf Fertilization

Cool-season turfgrass plants shift their biological emphasis from root growth and food storage to foliage growth in the spring. Carbohydrates stored in the roots during winter are utilized in the spring to produce foliage. In the spring, turf is also recovering from damage inflicted over the winter.

Warm-season turfgrasses concentrate on root growth during late spring and summer months. They must go through the fall, winter dormancy, and spring transition before they resupply the carbohydrates in their roots. Texas A&M Agronomist Dr. James Beard has shown dieback of the roots of warm-season grasses following spring green up. By spring, warm-season turf is out of gas.

Nitrogen is defintely a necessity for turf health in the spring. However, some agronomists warn turf managers not to overdo nitrogen applications in the spring since excessive stimulation of foliage growth may deplete carbohydrate reserves and reduce the plant's ability to recovery from spring and summer stresses.

If you use quick-release fertilizers, apply the recommended amount of nitrogen in four parts throughout the year rather than dumping the entire amount onto the turf in the early spring. Slow-release nitrogen sources help prevent overly-lush turf since they release the nitrogen slowly over a two- to four-month period.

More turf managers are applying fertilizer in late fall to assist cool-season grasses as they store carbohydrates, and in the late spring and summer to help warm-season grasses do the same.

Plan Annual Displays

A complete landscape includes annual flowers. The impact of flowers goes a long way to indicate professionalism in landscaping. Commercial landscapes without annual and/or perennial flowers are incomplete.

The primary advantage of planning now for annual displays is you can contract with a local greenhouse and save a significant amount of money and get the types of plants you need. Waiting until the plants show up at local garden centers forces you to pay the going price and take what they have.

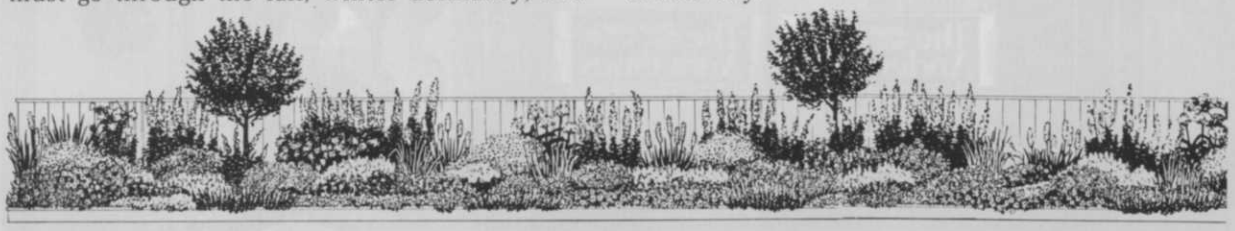
If flower beds are part of your current landscape, then now is the time to fine-tune the display to improved varieties or ones needing less maintenance. See the article by Ann Reilly in this issue for types of annuals and their proper location and use.

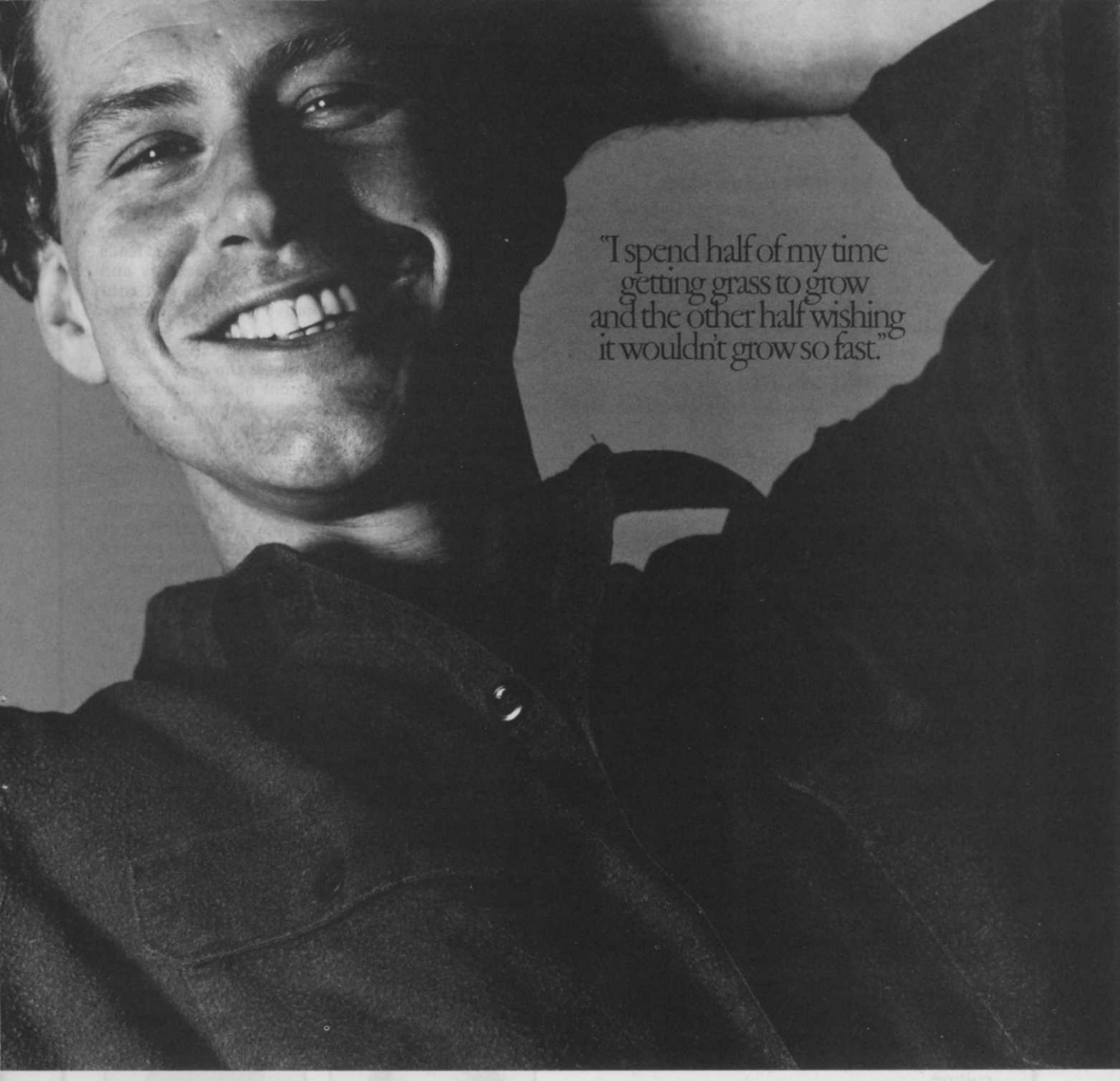
Weed Control

Keep in mind a second application of preemergence turf herbicide may be necessary. Postemergence turf herbicides should be selected and ordered.

Weed control in plant beds should start soon with heavy dependence on preemergence herbicides such as Ronstar, Devrinol, and Treflan. These save hours of hand labor later in the year.

Plant beds with serious weed problems last year should be fumigated with either Dowfume or Vapam. Be sure to protect or remove desirable plants. Moving plants now is easier than later as far as recovery.





A turf manager's world is held together by an endless string of paradoxes.

One day he puts up a fence to protect his turf. The next, he notices greener grass on the other side.

When skies are sunny, he prays for rain. Then three days into a gentle soaker, he wishes it'd clear up so he could get some work done.

Every day he learns something new about the world of growing fine turf. And every day he's baffled when what he knows ought to work doesn't.

But these are the little reminders that it's all worthwhile. Because more often than not, it all goes right.

He pits his knowledge about what ought to happen against the unpredictable odds of the natural world. And he wins.

The grass greens up on his side of the fence. The rain stops just in time. And what he knows ought to work performs exactly as he'd imagined it would.

In the final analysis, he hopes nobody ever develops the perfect grass—turf that grows rich green just so high and then stops.

After all, what fun would that be?

Pennfine Perennial Ryegrass covers more ground than any other turfgrass variety in the world. This ad pays tribute to the people who've sown that fifty million pounds of certified Pennfine seed.

Circle No. 155 on Reader Inquiry Card

PROBLEM SOLVERS

by **Balakrishna Rao,** Ph.D., and **Thomas P. Mog,** Ph.D.

Supplier for fish emulsion

Problem: *Are you aware of any supplier of fish emulsion? This is occasionally specified for landscape use but no suppliers are given. (Virginia)*

Solution: H.J. Baker & Bros. Inc., 100 E. 42nd St., New York, is listed in the Farm Chemicals Handbook as a distributor of fish meal and scraps.

Black locust blight

Problem: *What caused the 1983 blight on black locust? (West Virginia)*

Solution: I am not aware of a serious disease, i.e. blight, affecting black locust in your state this year. I have read where damage caused by the locust leafminer has been pretty dramatic in parts of West Virginia. The young (larvae) of this insect mine or eat the middle out of locust leaves. They don't eat everything but leave the upper and lower layers (epidermis) behind; like someone eating the meat out of a sandwich and leaving the bread behind. The leaves remain on the tree and the tree doesn't look too bad until it gets hot and dry. Usually around August the mined leaves dry up and turn brown. This apparent, sudden browning of the entire tree could be mistaken for a blight or wilt disease.

Check the fallen leaves. Break or cut some apart. If there is nothing inside, then the miner was the culprit. If you are not certain as to what I mean, just look at some leaves from a healthy tree and compare them with your "blighted" leaves.

Leafminer attack may make the trees look like they are dead, but unless something else is involved, they should recover. Losing all or nearly all of its leaves before autumn weakens the tree. Fertilization will help it recover. Locust leafminer passes the winter hidden in the dead leaves and litter. Raking and destroying leaves and other debris from beneath the tree eliminates some insects. Depending on how many miners make it through the winter, you may want to spray your trees with an insecticide in June-July. For more exact timing and what chemical to use, contact the West Virginia Department of Agriculture.

Saving trees from salt damage

Problem: *The trees we have along the sidewalks on campus catch the run-off containing rock salt. This is causing problems. We heard that gypsum neutralizes salt. How much should we use? (Ohio)*

Solution: That depends on how "salty" the soil is or gets. You should first have the soil tested for soluable salts and pH. In general, turfgrasses and ornamentals become stressed at salt levels greater than 1500 ppm. If the soil is both sodic (high sodium) and acidic (low pH) and you want to "de-salt" and lower pH, then lime can be used. For alkaline soils and for acid soils where a pH change is not desirable, use gypsum. Both lime and gypsum contain calcium. Salt, sodium chloride, is removed or "neutralized" by exchanging calcium for some of the sodium (ions). Once the sodium has been released from the soil particles, it is mobile and can be leached away by rain or watering.

Excess salt is not only harmful to plants but degrades soil structure. A high sodium content leads to decreased water movement, permeability and aeration. Lime and gypsum are used as soil conditioners because they improve structure, drainage and facilitate leaching.

For your purposes, neutralizing salt, a rate of 50-75 pounds/1,000 square feet is the usual recommendation. Because movement of calcium can be slow, the treatment is not effective when the gypsum or lime is applied during the period of salt application and worked into a depth of six to eight inches. The amount of calcium sulfate in products sold as gypsum can vary.

The aforementioned rate is for 100 percent calcium sulfate and for lime applied as quicklime or limestone. If the gypsum you use is only 50 percent calcium sulfate then you should use twice as much, i.e. 100 to 150 pounds/1,000 square feet.

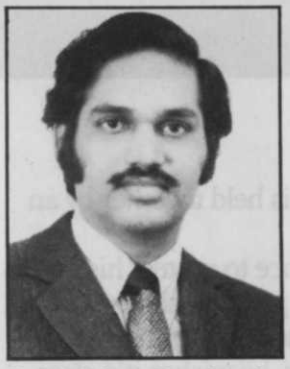
Leaching alone is beneficial if the water is salt (sodium) free and if the drainage is good. With good drainage and heavy watering, salt levels can be reduced as much as 50 percent. It takes good drainage and watering to get the most benefit from the soil conditioners, too.

Tilling wakes up dormant weeds

Problem: *This fall I tilled an established, weed-free lawn and seeded with certified seed. Now there are lots of weeds. Where did they come from since they were not evident before? (Missouri)*

Solution: Studies have shown various weed seeds can remain viable in the soil for several years and these may be triggered to germinate when the soil is disturbed and brought to the surface.

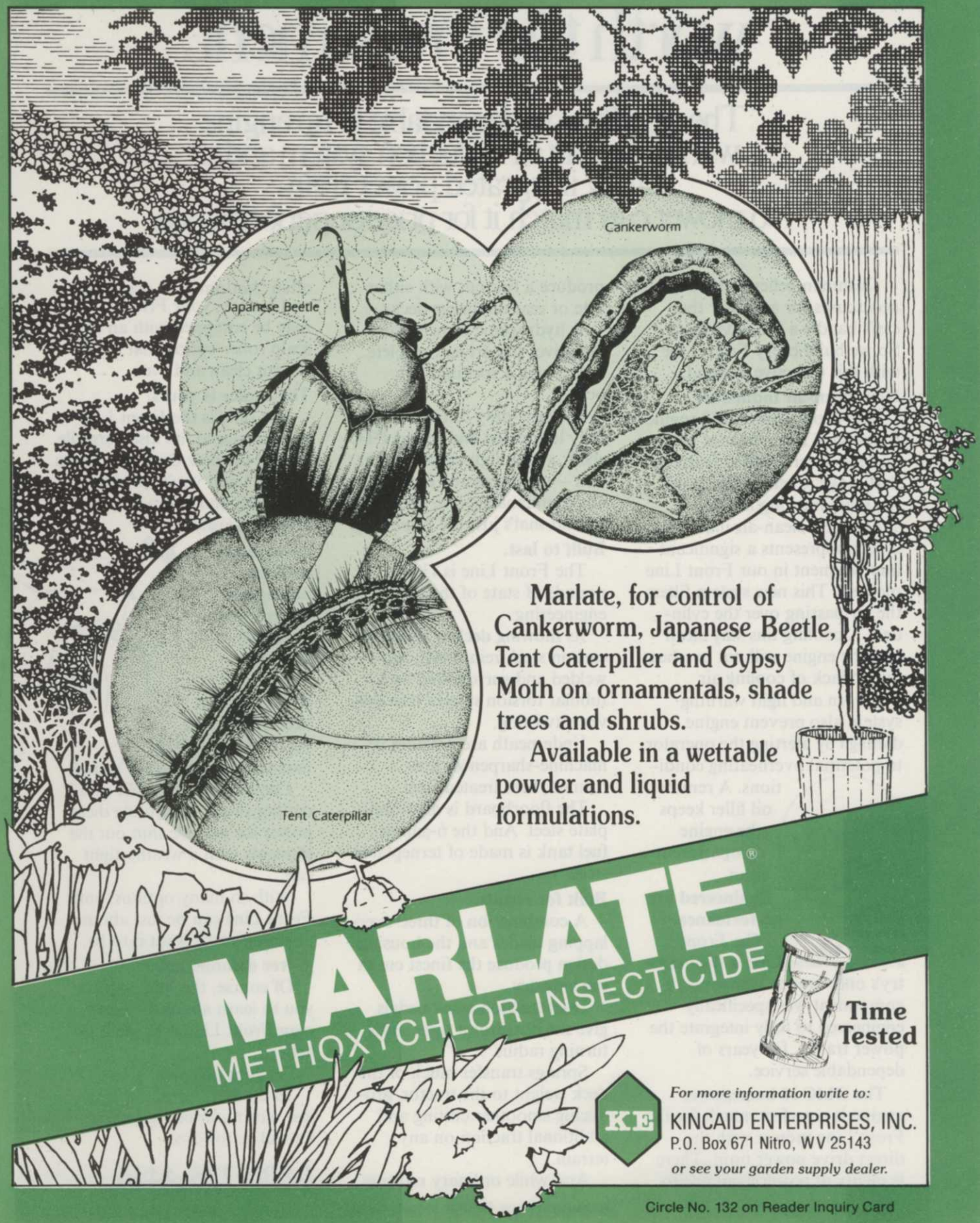
Mow the lawn at least two to three times before applying herbicides.



Balakrishna Rao is plant pathologist and Thomas Mog is pest management specialist for Davey Tree Expert Co., Kent, OH.

Questions should be mailed to Problem Solver, Weeds Trees & Turf, 7500 Old Oak Boulevard, Cleveland, Ohio 44130. Please allow 2-3 months for an answer to appear in the magazine.

Control!



Circle No. 132 on Reader Inquiry Card

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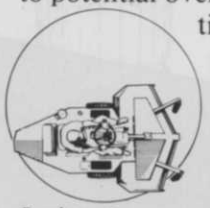

Dual traction assist pedals provide a tight, zero turning radius.

Engineered for performance.

The Front Line is the industry's only mower whose every component was specifically engineered to fully integrate the power train...for years of dependable service.

The OMC 18 horsepower engine is a perfect match for the Front Line mower with the direct drive power train. There is plenty of power available to produce a fine cut with either side or rear discharge decks.

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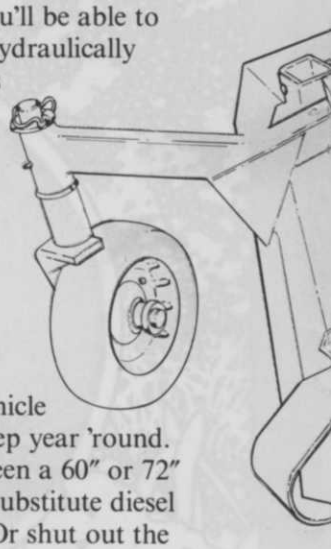

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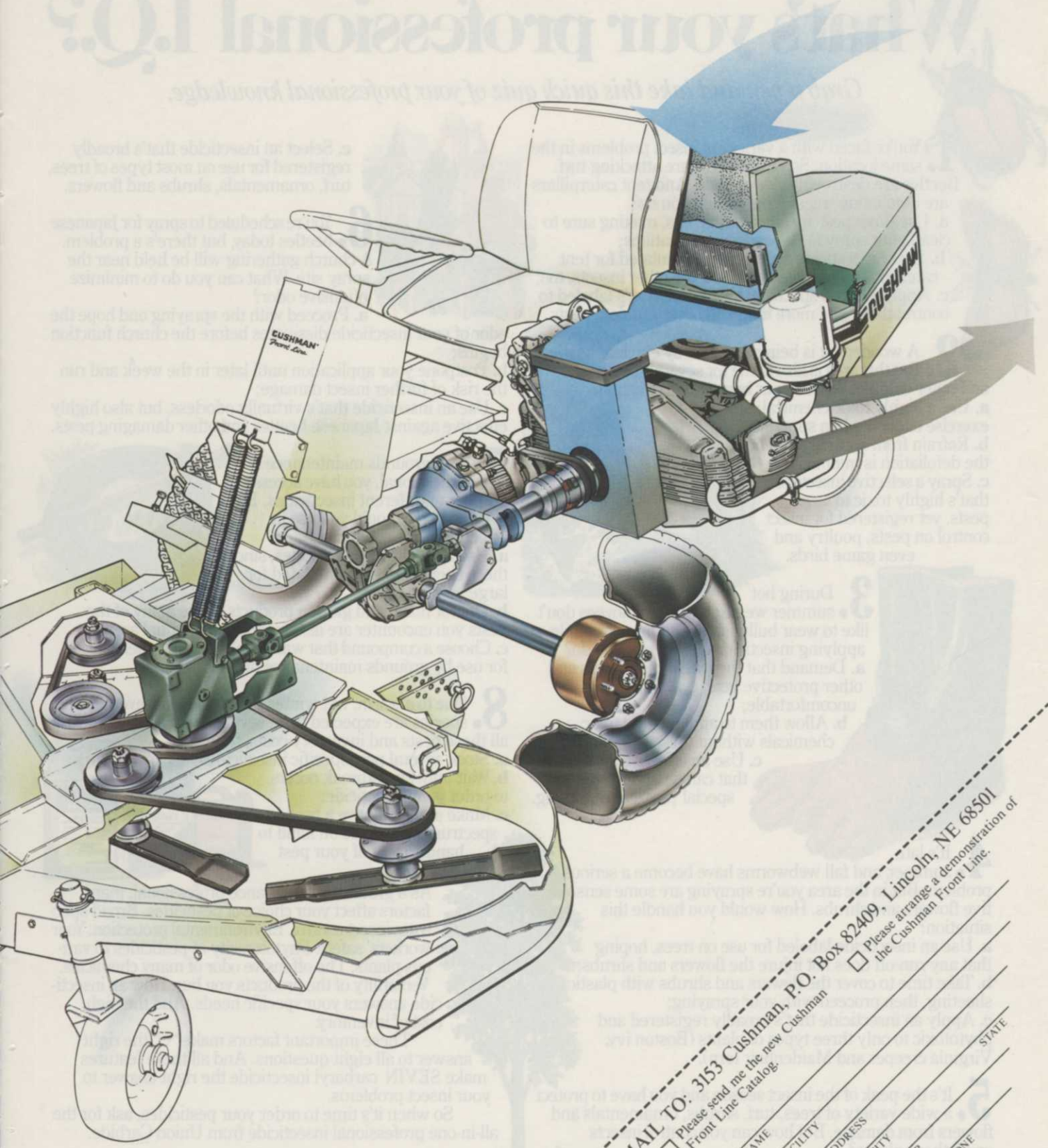

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What's your professional I.Q.?

Grab a pen and take this quick quiz of your professional knowledge.

1. You're faced with a variety of insect problems in the same location. Sod webworms are attacking turf. Beetles are destroying flower beds. And tent caterpillars are defoliating trees. What should you do?

a. Use three pest-specific insecticides, making sure to clean your spray tank between applications;
b. Spray a pesticide specifically formulated for tent caterpillars and hope it controls the other insects, too;
c. Apply a broad-spectrum insecticide that's labeled to control these and more than 210 other problem pests.

2. A wooded lot is being attacked by elm leaf beetles. But this area is also home for several species of birds and other wildlife. What's your best course of action?
a. Use a highly toxic chemical, but exercise caution when spraying;
b. Refrain from spraying and hope the defoliation is minimal;
c. Spray a selective insecticide that's highly toxic to target pests, yet registered for insect control on pests, poultry and even game birds.

3. During hot summer weather, your employees don't like to wear bulky safety equipment while applying insecticides. What can you do?
a. Demand that they wear respirators and other protective gear, even if it is uncomfortable;
b. Allow them to apply highly toxic chemicals without these safeguards;
c. Use an effective insecticide that can be applied without special protective clothing.

4. It's late summer, and fall webworms have become a serious problem. But in the area you're spraying are some sensitive flowers and shrubs. How would you handle this situation?
a. Use an insecticide labeled for use on trees, hoping that any run-off does not injure the flowers and shrubs;
b. Take time to cover the flowers and shrubs with plastic sheeting, then proceed with your spraying;
c. Apply an insecticide that's broadly registered and phytotoxic to only three types of plants (Boston ivy, Virginia creeper and Maidenhair fern).

5. It's the peak of the insect season and you have to protect a wide variety of trees, turf, shrubs, ornamentals and flowers from damage. But how can you control insects on all these plants?
a. Use several different insecticides, each formulated for specific plants;
b. Treat everything with a tree and shrub spray, hoping that this product does an adequate job on turf, flowers and other plants;

c. Select an insecticide that's broadly registered for use on most types of trees, turf, ornamentals, shrubs and flowers.

6. You're scheduled to spray for Japanese beetles today, but there's a problem. A church gathering will be held near the spray site. What can you do to minimize offensive odor?
a. Proceed with the spraying and hope the odor of your insecticide dissipates before the church function begins;
b. Postpone your application until later in the week and run the risk of further insect damage;
c. Use an insecticide that's virtually odorless, but also highly effective against Japanese beetles and other damaging pests.

7. As a grounds maintenance professional, you have access to a number of different insecticides. But what criteria should you use in selecting these products?
a. Use agricultural insecticides, since these chemicals are formulated for large-volume users;
b. Opt for home and garden products, since many of the pests you encounter are also found in residential areas;
c. Choose a compound that was developed and labeled for use by grounds maintenance professionals.

8. Due to a warm, wet winter, infestations of several insect species are expected to be severe. How can you control all these pests and inventory costs, too?
a. Stock several pest-specific insecticides;
b. Wait until an outbreak occurs to order your insecticide;
c. Make sure you have a broad-spectrum insecticide on hand to handle most of your pest problems.

As a grounds maintenance professional, many factors affect your choice of pesticides. Broad-spectrum insect control. Environmental protection. Your workers' safety. Phytotoxicity of pesticides to various plants. The offensive odor of many chemicals. Versatility of the products you buy. How an insecticide answers your specific needs. And the high cost of inventory.

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Circle No. 176 on Reader Inquiry Card

WEED CONTROL GUIDE

Prepared by the staff of Weeds, Trees & Turf

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Dr. Robert Shearman and Dr. Ray Dickens team up for the latest turf weed control information.

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Preemergence herbicides cut hand labor in plant beds greatly says Dr. Elton Smith.

70 AQUATIC WEED CONTROL
For the first time, aquatic weeds are considered as well as effective cultural and chemical controls.

76 DIRECTORY OF HERBICIDES, MANUFACTURERS
Use this directory to shop for herbicides and to locate distributors in your area.

TURF

by Dr. Ray Dickens and Dr. Robert Shearman

This annual project is continuously updated and expanded to provide turf and landscape managers a comprehensive, up-to-date reference for weed control.

For the 1984 edition, we have added sections on roadside and aquatic weed control. The reviewers for this issue were Dr. Ray Dickens of Auburn University and Dr. Robert Shearman of the University of Nebraska.

The core of the manual was written by Dr. Euel Coats of Mississippi State University and Dr. Elton Smith of Ohio State University. Photos and illustrations were provided by Velsicol Chemical Co., O.M. Scott & Son, the New York State Turfgrass Association and the authors.

Every turf or landscape manager faces weed problems. It is perhaps the most critical part of landscape management.

Weeds are part of the natural landscape. A lawn, garden, or man-made landscape is an unnatural state requiring regular cultural practices to maintain. If these practices aren't followed the landscape will return to its natural state in a few short years.

Once established, a man-made landscape can resist weeds best if the desired plants are healthy and vigorous. As soon as the desired plants are put under stress, weeds will move in.

Stress can come from many sources: poor soil; too much or too little shade, fertilizer, or water; compaction and damage from people and machines; and poor location.

Maintenance practices can also cause stress. Mowing too low, fertilizing too much, applying chemicals which discourage helpful organisms, and compaction and damage caused by maintenance equipment should be corrected as part of a weed control program.

Efficiency and economy in weed control programs are obtained by reducing or eliminating the stress in conjunction with herbicide applications. Rarely do herbicides alone completely eliminate, or maintain at acceptable levels, the weeds in turf or landscape.

Efficiency may also require changing the components or design of a man-made landscape. If the design is not worth the maintenance level required to keep it in shape, then changes can and should be made. The expense of changing the landscape can be recouped later in lower maintenance costs.

A fairly complex landscape design can be made more efficient by replacing high-maintenance plants with lower-maintenance material. Certain turf cultivars require less care and resist weeds better than others.

Control by location

Location makes a major difference in weed control techniques. Not only does the type of location matter; such as lawn, plant bed, roadside or lake; but so does the geographic location of the landscape involved.

Warm-season weed control varies greatly from cool-season weed control. The weeds, desirable plants, soil, and even herbicides may be different.

Warm-season turf weed control is rather complex primarily because the large number of species and cultivars. There are at least six turfgrasses used in the Southern United States; bahiagrass, bermudagrass, carpetgrass, centipedegrass, St. Augustine, and zoysiagrass. Three of these (bahiagrass, carpetgrass and common bermudagrass) are often weed problems in the other Southern turfgrasses.

Dichondra and kikuyugrass can be added to the list of turf species, however, they are limited primarily to areas of the Southwest that are irrigated. They are also considered weeds in some locations.

A few cool-season turfgrass species are used in the South for winter overseeding to provide color while the warm-season grasses are dormant. These include annual and perennial ryegrass, roughstalk bluegrass, creeping bentgrass and red fescue. As a result, the southern turf manager needs to develop two dif-

ferent weed control programs, one for warm-season turf and one for the overseeded cool-season turf.

Cool-season turf managers must often deal with a mixture of turf species. A mixture of Kentucky bluegrass, perennial ryegrass, and red and chewings fescues is standard. This mixture of species is one hurdle turf growth regulators have not yet cleared since the individual turf species respond differently to present turf growth regulators.

Bentgrass and tall fescue are cool-season grasses planted alone. Tall fescue, long used for utility turf, is growing in popularity as fine-leaved, turf-type varieties are developed, especially in the transition zone. Sheep and hard fescues may gain acceptance as low maintenance turfgrasses in the future. Bentgrasses are used primarily for specialty turf, such as golf greens, and become weeds when they invade standard cool-season turf stands.

Weed control around woody ornamentals and annual and perennial flowers involves a greater variety of plants than turf. Advances in preemergence herbicides for plant beds have given a boost to weed control programs that have been largely mechanical or hand labor.

Roadside weed control is also utilizing herbicides to reduce labor and mechanical control costs. Control of tall-growing plant species is necessary for driving safety.

Control of water weeds is a growing concern as lakes become recreation centers for residential developments. Respect for lakes and rivers has increased dramatically in the past decade. Care of these water areas has grown in importance.

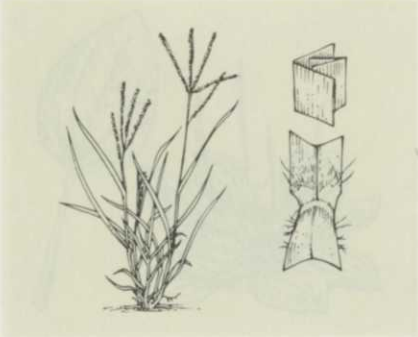
Weed identification

Proper weed species identification and an understanding of life cycles enables landscape managers to correctly and effectively time preemergence and post-

Poa Annua

Nutsedge

Crabgrass



Goosegrass

emergence herbicide applications.

Many of the weed problems a landscape manager faces can be solved by knowing the weed history of the areas managed. Records should be kept to show the development of weed problems.

Weed sources are present in all soils in the form of seed, rhizomes, stolons, bulbs and tubers. Effort should be made prior to planting to sterilize the soil where practical.

This reserve of weeds should be understood by the landscape manager and controlled. Disturbing the soil for any reason may trigger a weed problem, including maintenance practices such as aerification, vertical mowing, or seeding. If possible, soil should not be disturbed during key weed germination periods and following application of preemergence herbicides.

If a weed problem doesn't conform to the weed history, then the weed was brought into the area in soil, seed, or another carrier.

Life cycles

All plants can be classified according to life cycle as either annual, biennial, or perennial.

ANNUALS complete their life cycle in one growing season. They are further divided into summer and winter annuals.

SUMMER ANNUALS germinate in the spring and summer and complete their life cycle during the warm growing season. Large crabgrass and goosegrass are examples of summer annuals.

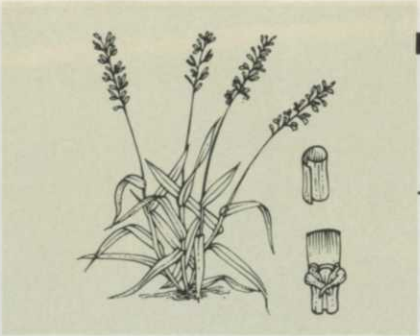
WINTER ANNUALS germinate in the fall and late winter, complete their life cycle during the spring, and die in early summer. Annual bluegrass, henbit, and common chickweed are winter annuals.

BIENNIALS require two years to complete their life cycle. In the first year, biennials form rosettes (radial clusters of leaves close to the soil). The second year they send up flower stalks and produce seed. Musk thistle is a biennial.

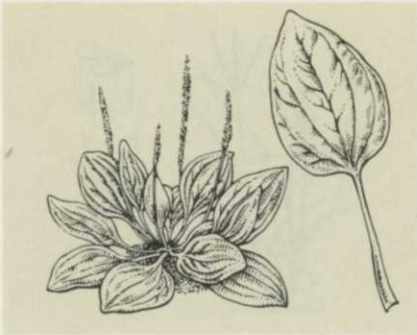
PERENNIALS live for three or more years and are especially difficult to control because they reproduce by vegetative means, by seed, or both. Perennials are often well-established before their presence is recognized. Examples are dandelion, yellow nutsedge, quackgrass, wild onion and garlic, torpedograss, and dallisgrass.

Perennials spread vegetatively by structures above and below the ground, called rhizomes, stolons, and tubers. These structures must be killed by postemergence systemic herbicides to effectively control perennials. Postemergence control is generally considered the most effective means of control, although preemergence herbicides can be used to stop perennials from spreading by seed.

TURF



Tall Fescue



Plantain (not Buckhorn plantain)

Ground Ivy

Quackgrass

Grass or broadleaf

A second distinction important to weed control is whether the weed is grassy or broadleaf. Herbicides are often selected by how they disrupt the life processes of either grasses or broadleaf weeds. The effectiveness of these herbicides depends greatly upon this distinction.

Grassy weeds include crabgrass, annual bluegrass, goosegrass, quackgrass and any turfgrass in the wrong place, such as bentgrass, tall fescue, bermudagrass or kikuyugrass.

Broadleaf weeds include dandelion, clover, ground ivy, chickweed, plantain and lambsquarter.

Grassy weeds

Annual bluegrass Persistant seedheads and blotches of heat-killed annual bluegrass make this a weed in the summer in the North and in the winter in the South. It thrives in well-fertilized, irrigated, low-cut turf. Its shallow roots and overdedication to seed production make annual bluegrass very vulnerable to high temperatures and drought. Not all types are annual, despite the name.

Bentgrass can encroach by stolons or seed into cool-season turfs consisting of Kentucky bluegrass, perennial ryegrass, and fine-leaved fescues. It has extremely small seed making it difficult to clean from contaminated lots of seed. Bentgrass is a major target of certified seed producers during production and cleaning. It is difficult to remove from lawns and must be controlled with a non-selective, postemergence herbicide such as Roundup.

Bermudagrass, like bentgrass, encroaches on other desired turfgrasses. A desirable turfgrass for the South, bermudagrass can be undesirable in other turfs. This extremely hardy grass can outperform other warm-season turfgrasses. It spreads by stolons and rhizomes. Bermudagrass goes dormant and turns brown early in the fall in cooler climates, in contrast to cool-season turfgrasses which stay green into the winter.

Crabgrass is the predominant target of most turf weed control programs. It spreads by seed and by rooting at the lower nodes (where stem and leaf join). This pale green grass forms dense patches damaging the appearance of a lawn. Since it is an annual grass it can be controlled with preemergence herbicides.

Goosegrass is an annual grass sometimes called silver crabgrass. It is particularly troublesome in thinned turfs in compacted, wet soils. Preemergence control has been variable, but some of the newer herbicides hold promise for effective control. Goosegrass can be controlled with postemergence herbicides if these materials are applied in the early stages of its development.

Kikuyugrass is a serious problem on golf courses on the Pacific Coast. It spreads by seed and rhizomes at an amazing pace. The only control so far is non-selective postemergence herbicides.

Nutsedge is a major turf and crop weed. It is difficult to control because it is a perennial that spreads by seed and nutlets or tubers. Yellow nutsedge has a light-green to yellow-green color that contrasts with the color of the desired turfgrass. Purple nutsedge is a related species which is a serious problem in the South.

Postemergence herbicides are most effective for nutsedge control. BASF Wyandotte is promoting Basagran specifically for yellow nutsedge control. Repeat herbicide applications are necessary since no systemic herbicides are available for nutsedge in turf.

Quackgrass is a hard-to-control perennial that spreads vigorously by rhizomes. Quackgrass is often introduced during establishment when contaminated topsoil is used. No selective control exists. Quackgrass must be controlled using spot treatment with

a nonselective herbicide.

Tall fescue is a bunch-type grass with short, stubby rhizomes. It does not creep, like red fescue. This grass tolerates poor soils and has a low fertilization requirement making it more able to survive poor locations than Kentucky bluegrass or perennial ryegrass. Tall fescue is often used in low-maintenance sites where drought tolerance is important.

Tall fescue is difficult to remove from other turf stands it encroaches. Small infestations can be eliminated by digging them out. More extensive infestations require spot treatment with a nonselective, postemergence herbicide. Recent research has shown selective control may be possible for tall fescue in Kentucky bluegrass turfs. The products used in the research are not currently labelled for turfgrass use.

Wild garlic is a perennial grass-like weed that spreads by seed and underground bulbets. Some preemergence herbicides prevent its spread by stopping seed germination, but these materials have little or no effect on the bulbets. Postemergence, systemic herbicides are most effective for wild garlic control since they are readily translocated to the bulbets.

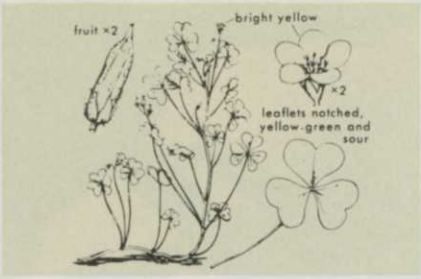
Broadleaf weeds

Black medic is occasionally confused with clover. Black medic is a winter annual. It is common throughout the U.S. and has small yellow flowers.

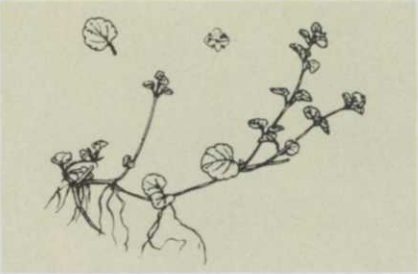
Buckhorn plantain is a perennial present in many low-budget lawns and mow-only areas of parks. Buckhorn has a taproot that defies hand weeding.

Common chickweed is a winter annual that is common growing in moist, shaded areas. It is succulent in growth, light-green in color and has small white flowers.

Mouse-ear chickweed resembles common chickweed in its spreading growth habit, but it is perennial and has fuzzy leaves.



Yellow Wood Sorrel


Speedwell

Spurge

Heal-all

White clover is a perennial broadleaf weed with white to pink flowers. Its familiar-shaped leaves spread close to the ground.

Dandelion is a perennial famous for its taproot and yellow flower which becomes a puffy seedhead in late spring.

Ground ivy is sometimes called creeping charlie. It is a perennial that persists on poorly-drained, shaded sites. A member of the mint family, ground ivy hugs the ground and produces a purple flower.

Henbit is taller than ground ivy with purple flowers and scallop-shaped leaves. It is a winter annual most noticeable in early spring.

Heal-all is a hairy-leaved perennial common in new and poorly-maintained lawns throughout the U.S. It can spread beneath the level of mower blades.

Lambsquarter is a summer annual with light-green to gray-green foliage. It can be a severe problem in newly-seeded or infrequently-mowed turfs. Mowing helps control lambsquarter.

Plantain has broad leaves which lay flat on the surface of the soil. This perennial sends up tall purple stalks containing seeds.

Red sorrel is a tenacious perennial with arrow-shaped leaves. It spreads by roots and rhizomes and can quickly overtake desirable turf weakened by acid soil or low fertility. Alkaline soils can discourage red sorrel.

Yellow wood sorrel is also known as oxalis. This perennial broadleaf spreads by rooting at the nodes and by seed from pods following flowering. Small yellow flowers mature into long, narrow seedpods. Selective control is difficult.

Speedwell is an example of a plant that was introduced for use in rock gardens and subsequently escaped to become a weed. There are both annual and perennial types of this weed. White to purple flowers bloom above heart-shaped seedpods.

Annual types are controlled with pre- and postemergence herbicides. Perennial types are controlled with spot treatment of postemergence herbicides.

Spurge is a term used by turf managers for both prostrate and spotted spurge. Both contain spots on their upper leaves, milky sap in their branches, and have a spread-

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Monsanto

Circle No. 150 on Reader Inquiry Card

ing growth habit. It is a summer annual and prolific seed producer with a lengthy period of germination throughout the spring and summer. Spurge is best controlled with preemergence herbicides.

Sow thistle is an annual with flowers similar to dandelion but its leaves have spines on the edges and deeper indentations. Selective control is effective.

Herbicides

Herbicides are chemicals used to kill or inhibit the growth of plants. There are many kinds of herbicides for general and specific weed control available in a number of packaged forms. All are subject to the influences of environmental conditions and man's ability to use them to his best advantage.

Herbicides can be mixed, depending upon formulation and chemical compatibility with other herbicides or adjuvants to increase efficiency. Many herbicides are premixed to make your job easier and to provide control of a number of weeds. Use premixed herbicides unless you understand all the complexities and safety considerations.

Mode of action, length of residual, and selectivity are good ways to differentiate herbicides. All herbicides can be categorized by the following outline.

1 FOLIAGE APPLIED
- **A** Contact
  - ☐ Selective
  - ☐ Nonselective
- **B** Translocated (Systemic)
  - ☐ Selective
  - ☐ Nonselective

2 SOIL APPLIED
- **A** Short Residual
  - ☐ Selective
  - ☐ Nonselective
- **B** Long Residual
  - ☐ Selective
  - ☐ Nonselective

Foliage applied—contact—selective herbicides are of little importance in turf or landscape.

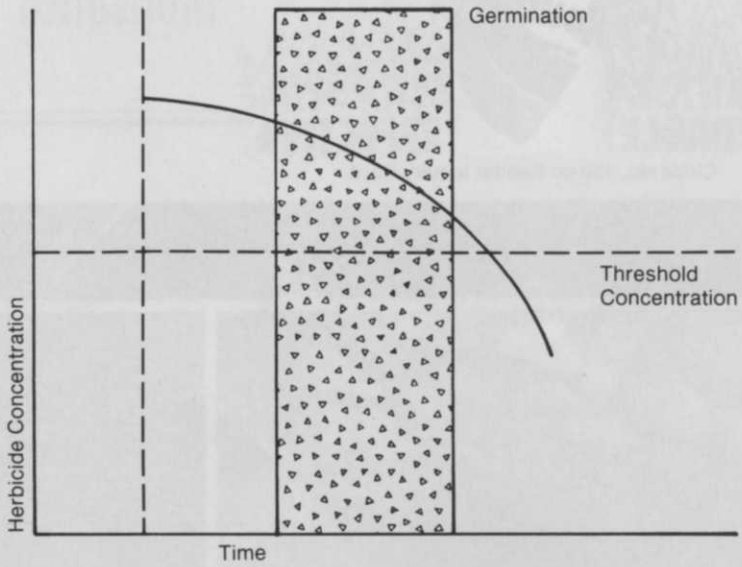
Foliage applied—contact—nonselective herbicides for turf and landscape uses include paraquat and cacodylic acid(Phytar 560). These herbicides will kill all green and growing foliage contacted by the spray solution.

Dormant bermudagrass, zoysiagrass, and other warm-season perennial turfgrasses are not usually affected by application of this type of herbicide. To escape injury, foliage must be completely dormant.

Contact type herbicides enter the plant where applied and do not move significantly beyond that point (limited upward or downward translocation). Spray volume and coverage of the leaf surface of the target plants is very critical for maximum control. Extremely low volume applications will often result in inadequate coverage and will kill only

continued on page 46

The effect of delaying the application of preemergence herbicides



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FUSILADE means complete grass control because it controls weeds systemically, even penetrating into roots, rhizomes and stolons. And FUSILADE can be used with more ornamental species than any other postemergence grass herbicide. It's a new day in complete grass control for ornamentals. For more information on FUSILADE, call the ICI Americas Information Service toll-free, 1-800-441-7757, extension 3192. ICI Americas Inc., Wilmington, DE 19897.

FUSILADE™ HERBICIDE

The Grass Master

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Here's a clue. D·z·n® Diazinon® controls every insect you see here, from the root-eating white grub to the juice-sucking chinch bug. In fact, D·z·n Diazinon has the biggest label of any turf insecticide. And that makes it the perfect choice for broad spectrum control in both commercial and residential turf.

Need another clue? D·z·n controls damaging worms including

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insects are hiding picture?

cutworms, sod webworms and armyworms. Plus it takes care of nuisance pests like ants, fleas and chiggers.

We've mentioned 8 species on the label but that's not even half.

Keep counting. And when you place your next insecticide order, ask your supplier for the biggest label in the business—D·z·n Diazinon.

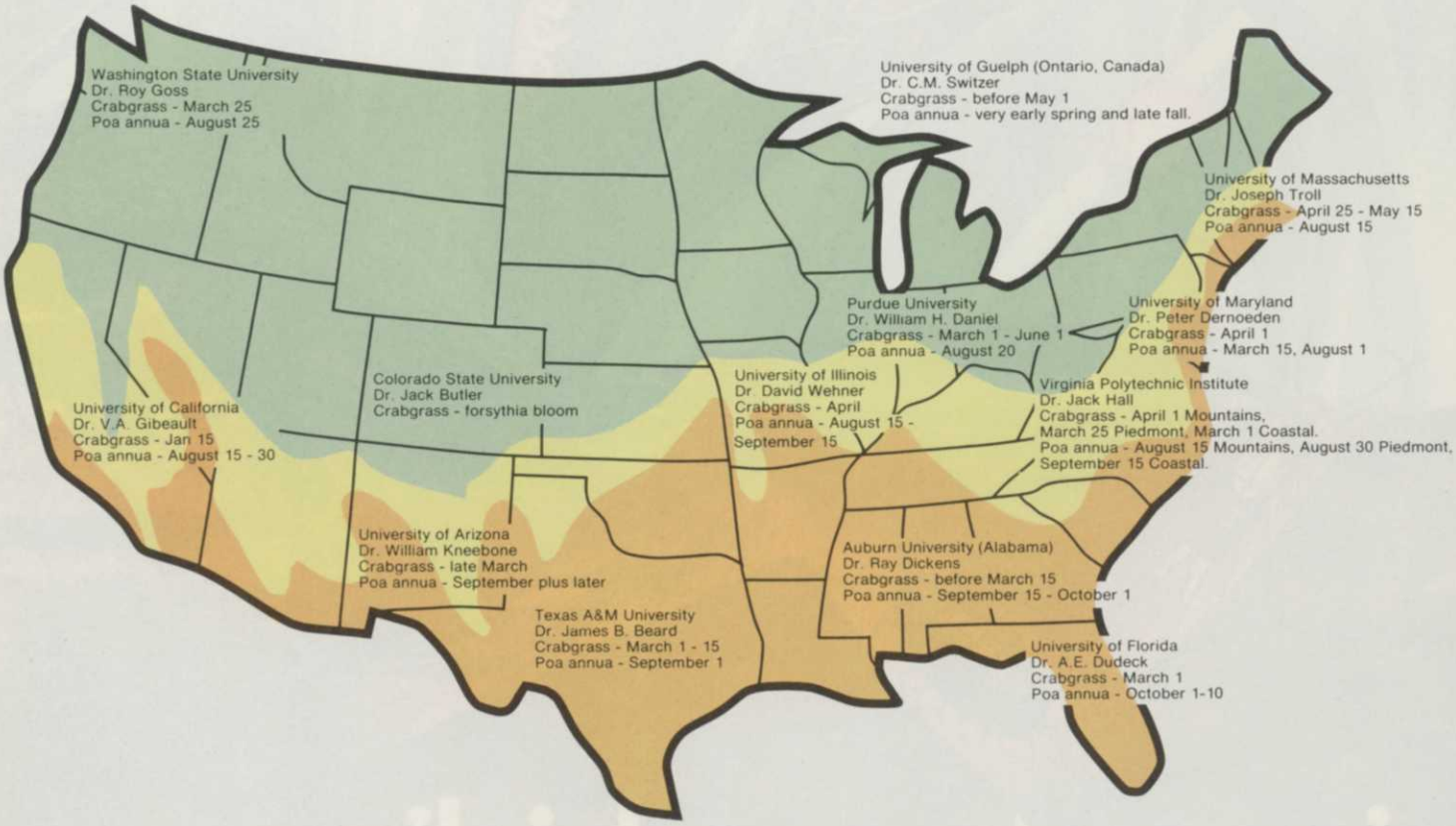
PS: You'll find the answer below.

CIBA–GEIGY

Answer: D·z·n Diazinon controls all twenty-three insects seen here.

TURF

Suggested Timing for Preemergence Herbicides to Control Crabgrass and Annual Bluegrass



the upper layer of the foliage canopy. Regrowth occurs in a comparatively short period of time.

Increases in control and speed of activity of contact herbicides depends upon the volume of water mixed with them. Increases in activity can be demonstrated up to 50 to 60 gallons per acre of water used. Control is generally poor with less than 20 gallons per acre. A good compromise is 30 to 40 gallons per acre.

Foliage applied—translocated—selective herbicides are absorbed into the plant at point of contact and spread throughout the plant tissues. These herbicides are most effective when applied to actively growing weeds that are storing food reserves in underground structures, such as roots, rhizomes, and tubers. For example, dandelions are most effectively killed by 2,4-D applied in the fall when the plant is storing reserves in its taproot.

The most common foliage applied-translocated-selective herbicides are the phenoxys (2,4-D, mecoprop), dicamba(Banvel), bromoxynil, and the arsenicals (MSMA and DSMA). They are the only group of selective herbicides effective on perennial weeds since they kill the foliage and the reproductive structures.

Spray volume and coverage is not as critical with translocated herbicides as with contacts. However, adequate coverage is essential for maximum weed control (spray volumes from 30 to 40 gallons per acre).

Foliage applied—translocated—nonselective herbicides are used in peripheral areas, such as along fences or structures, and for renovation of turf areas. Examples of foliage applied-translocated-nonselective herbicides are dalapon(Dowpon), amitrole, and glyphosate(Roundup). These materials generally control all weed species sprayed.

Like foliage applied-contact-nonselective herbicides, translocated-nonselective herbicides can be used to control cool-season perennial grasses infesting warm-season turf when applied while

Keep roadside grasses from overwhelming your maintenance budget. Spray Embark® PGR.

Don't let the long stretches of grass growing along your roads capsize your maintenance budget.

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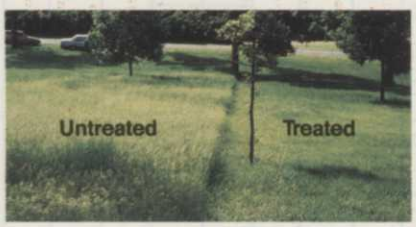

area in about one-sixth of the time it takes to mow an area of identical size.

Embark PGR also eliminates labor-intensive hand-trimming around guardrails and trees, and maintains improved sight distance at intersections. It reduces costly mowing frequency on bridge abutments, dangerously steep inclines, and along rights-of-way where mowers have difficulty.

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*Suggested retail price.

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3M Hears You...

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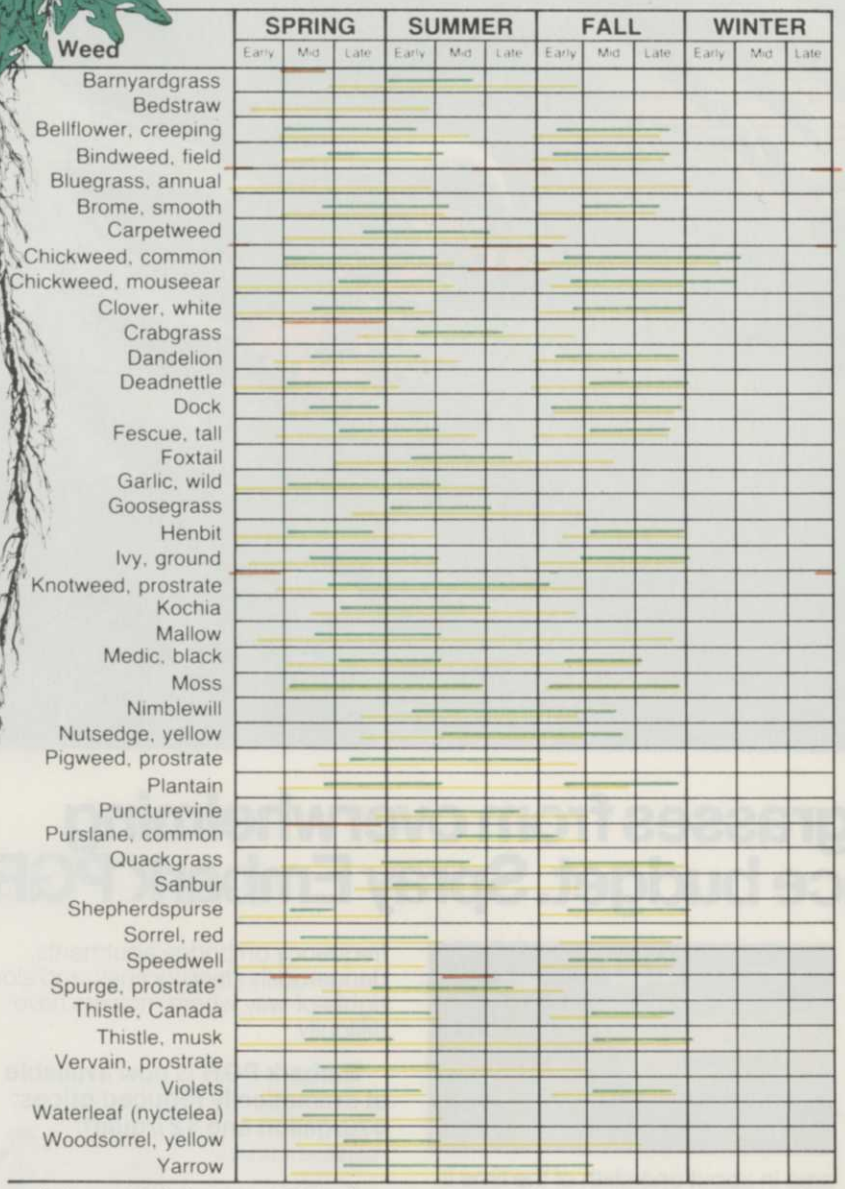
CHART 1
Growth and treatment periods



Active period of plant growth. Varies from year to year and from north to south.
Apply preemergence chemicals.
Apply postemergence treatments. Approximate periods may vary two weeks from season to season.

* Preemergence herbicide applications should be made a second time in late June or early July.

the warm-season grass is dormant.

Soil applied—short residual—selective herbicides include preemergence herbicides such as DCPA(Dacthal), benefin(Balan), bensulide(Betasan), atrazine, simazine, and pronamide. Simazine and pronamide applied to the soil will also control established annual bluegrass as preemergence herbicides.

Maximum residual activity of these herbicides is a matter of weeks to a few months, compared to several months for long residual herbicides. Spray volume is not as critical as with postemergence herbicides, but even distribution in necessary for uniform effective control.

Preemergence herbicides are the best approach to control weeds germinating from seed. They eliminate competition from newly germinated weeds prior to application of postemergence herbicides.

Soil applied—short residual—nonselective herbicides are used as temporary soil sterilants. They are usually referred to as fumigants and include methyl bromide and metham(Vapam). They are active in the vapor forms.

Methyl bromide is a gas at atmospheric pressure while metham is a liquid that converts to a toxic gas in the soil. Because of their volatile nature, both compounds require some kind of sealing to prevent vapor loss to the atmosphere. A plastic or gas-tight cover must be used for methyl bromide fumigation. Water can serve as the seal for metham, although a plastic cover makes control more consistent.

Both herbicides are excellent for killing vegetative structures of perennial plants such as bermudagrass, nutsedge, and torpedograss and are effective on a large number of weed seed, fungi, and insects.

This group of chemicals is the only one that will kill weed seed before germination. All other herbicides work only if applied to germinating or germinated seed.

The effectiveness of fumigants is highly dependent upon soil moisture, temperature, compaction, and texture. They are most effective when applied to friable or well-aerated soils at temperatures above 70 degrees F. Diffusion of vapors can be

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restricted by excess moisture or compacted soils.

Soil applied—long term residual—selective and nonselective herbicides will provide total vegetation control for several months. They are used primarily for rights-of-way and peripheral weed control along fences and buildings. They last too long for turf renovation and may move laterally in the soil to various degrees.

Bromacil(Hyvar) and borate compounds are just a few examples. Several mixtures of these and other compounds for quick foliage kill, such as amitrole, are available.

Extreme care should be taken when applying these herbicides near desirable plants.

Conditions are key to herbicide effectiveness

Most herbicidal failures aren't failures of the herbicide. They are the result of using herbicides without full consideration of the conditions which make them most effective. These conditions include temperature, moisture, timing, application method, and characteristics of the target weed.

To be most effective, herbicides must be applied at the appropriate time in relation to germination or growth of the target weed species and in the right place.

In turf, postemergence herbicides are applied directly on the target weed and preemergence herbicides are applied to the soil.

Since most herbicide applications are made on established turf, it may appear preemergence herbicides are applied to the foliage. In fact, they must be washed off the foliage and down to the soil to be effective, either by supplemental irrigation or rainfall.

With postemergence herbicide applications, irrigation or rainfall is detrimental since the herbicide needs to cling to and be absorbed by the weed foliage.

Preemergence applications should be made before weed seed germinates and should last throughout the germination period to be effective. They do not have any effect on established weeds. Their action is exerted only after the seed germinates and growth commences.

Theoretically, preemergence herbicides form a chemical barrier between the weed seed and the soil surface. Therefore, they must be applied uniformly to the soil prior to germination to be effective. A critical threshold concentration of preemergence herbicide must be maintained in the soil throughout the germination period. Preemergence herbicides with short soil residual may require split applications to maintain the critical concentration.

Dry soil severely reduces the effectiveness of preemergence herbicides unless moisture is added soon after treatment.

Postemergence applications are applied to the weed foliage following germination and emergence. They act either as contact or systemic (absorbed and translocated) herbicides.

Contact herbicides act rapidly while systemic herbicides usually require several days to produce visible results. Systemic herbicides usually kill the entire plant while contact types only kill the foliage contacted by the herbicide.

Postemergence herbicides are most effective when applied to young, actively growing plants when the temperature is above 70 degrees F. Foliar applied herbicides are also less effective if soil is dry.

Surfactants are frequently recommended for use with postemergence herbicides. For consistent results use nonionic agricultural surfactants, sold specifically for use with herbicides.

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TURF

Herbicide selection

Since the growth of the professional lawn care industry, the choice of turf herbicides and formulations has increased. Two or more herbicides may be equally effective in a given weed situation. Also, the same chemical may be available in a variety of commercial formulation trade names.

Selection of a herbicide and formulation is determined by:

- the weed species involved
- the availability of the herbicide
- type of equipment at your disposal
- time of application
- your budget for weed control
- precautions needed to limit exposure to desirable plants, humans, and animals, and
- residual of the product.

All recommended rates of application are based on either active ingredient or acid equivalent. Commercial products may have the same herbicides but have different percentages of active ingredients. The label will provide the exact amount of herbicide in the container. It is wise to figure the price of a product on the basis of its active ingredient or acid equivalent.

For example, a herbicide is available in liquid formulations varying from six to less than one pound acid equivalent per gallon. Usually, the more concentrated products are more economical on a per pound basis.

Granular formulations of many herbicides are also available. In comparison to sprays, granular herbicides have both advantages and disadvantages.

The advantages are simpler application—no water or mixing required, less drift, and a tendency toward longer activity in the soil.

Disadvantages of granular herbicides are difficult calibration of application equipment and slightly higher cost.

The range of concentration, particle size of product, and varying rates of application complicate calibration. More concentrated materials are usually more economical but calibration errors are more critical. Calibration charts are supplied by manufacturers of granular applicators. Application equipment should be calibrated prior to intitial use each season and periodically checked during the season. This will ensure safe, effective and economical control.

Weed control strategy for warm season turf

Bermudagrass is the dominant turf species in warmer climates. In general, herbicides that can be used on bermudagrass can be used safely on zoysiagrass.

continued on page 58

Tolerance of turfgrasses to preemergence and postemergence herbicides in Alabama - R. Dickens

	PREEMERGENCE									POSTEMERGENCE										
Established Turf	Oxadiazon	Siduvon	Pronamide	Benefin	DCPA	Napropamide	Bensulide	Atrazine	Simazine	ASU/AM	MSMA, DSMA CAMA	2, 4-D	Dicamba	Glyphosate	Mecoprop	Paraquat	Dichlorprop	Dalapon	Bromoxynil	Benfazonn
Warm Season																				
Bermudagrass	T	S	T	T	T	T	T	I	I	I	T	T	T	D	T	D	T	S	T	T
Zoysiagrass	t	-	I	T	T	-	T	T	T	S	T	T	T	D	T	D	T	S	T	T
Centipedegrass	s	-	I	T	T	T	T	T	T	S	S	I	I	D	I	D	I	S	-	T
St. Augustinegrass	T	-	I	T	T	T	T	T	T	T	S	I	I	D	I	D	I	S	T	T
Bahiagrass	-	-	-	T	T	T	T	O-S	I-S	S	I-S	T	T	D	T	D	T	S	-	T
Cool Season																				
Tall Fescue	t	T	S	T	T	T	T	S	S	-	T	T	T	S	T	S	T	S	T	T
Red Fescue	s	T	S	T	T	-	T	S	S	-	I	I	I	S	T	S	T	S	T	T
Kentucky Bluegrass	t	T	S	T	T	-	T	S	S	-	T	I	I	S	T	S	T	S	T	T

T Tolerant.
I Intermediately tolerant; use herbicide with care.
S Sensitive; do not use this herbicide.
D Dormant grasses tolerant to this herbicide; will kill growing plants.

NOTE: Some of the above combinations show a tolerance rating although such usage is not currently labeled.

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Circle No. 181 on Reader Inquiry Card

Dr. Ron Wilson and Dr. Roger Cahoy, of PBI/Gordon, show George Toma a lab experiment dealing with the eutectic characteristic of Trimec®. Toma is the groundskeeper at the Truman Sports Complex in Kansas City, which visiting media people have said is one of the most beautiful in the world. He uses Trimec in his weed control program and calls it the most efficient weapon in his arsenal.

Would you like to join George Toma in satisfying his curiosity about Trimec®?

TURF HERBICIDE

Every turf professional who has ever asked *why* ... or *why not* ... will enjoy eavesdropping on this visit with George.

Anyone who spends any time around George Toma becomes aware of his insatiable curiosity. He's never satisfied to just know *what* a product will do. Rather, he wants to get inside of it and find out *why* and *how* it does it.

It was this type of curiosity that led him into a study of pre-germination of rye grass, which in turn makes it possible to reseed damaged turf and play football on it 10 days later.

And it was this same curiosity that enabled him to envision a plan which involves putting turf over an artificial surface on Saturday; playing soccer on it Sunday; and then returning the field to artificial surface on Monday.

So none of us at PBI/Gordon was surprised when George Toma asked if we would let him get inside of a Trimec molecule so he could see "what makes Trimec tick."

"I guess just about every herbicide salesman in the world has brought us samples," grins Toma. "We've tried them all, and it's obvious that you folks at Trimec know something the others don't. As a matter of fact, we have never found a broadleaf weed that Trimec won't control."

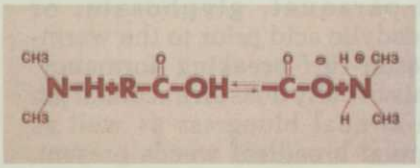
"Certainly the active ingredients in Trimec are no secret," Toma continued. "But can you tell me *what* in the world happens, and *why* it happens when

these ingredients become Trimec?"

(Gosh, George, you might as well ask us if we have any pictures of our grandchildren.)

In two words, it's synergism and eutectics:

Here is the Trimec formula



As you can see, it is a formulation of Phenoxy Acetic, Phenoxy Propionic and Benzoic Acid herbicides. At PBI/Gordon, the three acids are reacted to form a new compound. The resulting Trimec product is synergistic in that it has more power than the sum of the three acids individually.

Use of the eutectic principle causes the total complex to resist crystalization for a longer period of time than any of the components individually. Of course, the longer a herbicide can resist crystalization the better chance it has to penetrate the cuticle of the weed and translocate throughout the entire root system to result in total kill.

An explanation of eutectics

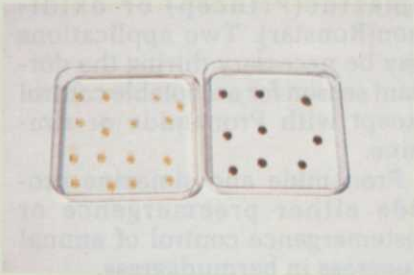
THE EUTECTIC PRINCIPLE
IN COMMON SOLDER ALLOYS

Composition at %						Melting Range, °C
Sn	Pb	Cd	Bi	Ag	Sb	
100						239
	100					327
63	37					183
62	36			2		179
15.5	32		52.5			96
13	27	10	50			70

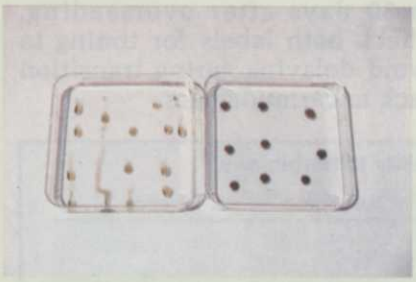
Perhaps the clearest demonstration of the eutectic principle can be found in common solder alloys, which consist primarily of tin and lead. Notice that 100% tin melts at 239 degrees Celsius. 100% lead melts at 327 degrees. But an alloy of 63% tin and 37% lead melts at 183 degrees. And note that by adding 2% silver the solder alloy will melt at 179 degrees.

In our laboratory we learned that we could utilize the principles of eutectics to delay crystalization of the Trimec complex in much the same way that eutectics can change the melting point of solder.

Visible proof of eutectics in Trimec



The drops on these two petri dishes were 5 hours old when photographed. Notice that the 2, 4-D on the right has started to crystalize, while the Trimec on the left has not.



Here is the dramatic effect of the eutectic principle. After a full week, the dishes are tilted and the Trimec is still in a liquid state and will actually flow down the dish while the 2, 4-D has crystalized into a solid state.

"Okay, for a long time I've known *what* Trimec will do. And now I know *why* Trimec does it," said Toma. "Now I want to know *how* you do it."

(We're all set to reveal that secret the day after Coke® tells Pepsi®, or vice versa.)

George Toma at Arrowhead with an experimental model of palletized turf, which would be the basic building block of removable turf that could be layed over an artificial surface; played on; and then removed. Even turf grown in a pallet contains weeds, so Toma sprays it with Trimec.

T.M.

Beware of substitutes. Look for the Trimec Seal on broadleaf herbicides, brush killers, and weed-and-feed fertilizers.

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TRIMEC®

TURF HERBICIDE

589-184

Circle No. 154 on Reader Inquiry Card

TURF

from page 54

However, special attention should be paid to herbicide labels regarding applications to centipedegrass and St. Augustine, which are similar to each other in their tolerance to herbicides.

Winter grass weeds Annual bluegrass is by far the most severe grassy weed infesting southern turf areas during the late growing season, through the dormancy period, and into the early growing season.

Beside decreasing the aesthetic value of turf, the primary objection to annual bluegrass is its rapid dieback in late spring. Bermudagrass coverage is usually slow following fade out of annual bluegrass leaving large sections of bare ground exposed. Other weeds, such as goosegrass, tend to move into bare areas.

Annual bluegrass control with preemergence herbicides is usually accomplished with either benefin(Balan), bensulide(Betasan), DCPA(Dacthal), Pronamide(Kerb), simazine(Princep) or oxidiazon(Ronstar). Two applications may be necessary during the dormant season for acceptable control except with Pronamide or simazine.

Pronamide and simazine provide either preemergence or postemergence control of annual bluegrass in bermudagrass.

There are two choices for annual bluegrass control on bermudagrass greens overseeded with perennial ryegrasses. Bensulide may be applied prior to overseeding. Ethofumesate(Prograss) may be applied 15 to 30 days after overseeding. Check both labels for timing to avoid delaying spring transition back to bermudagrass.

Broadleaf weed susceptibility to herbicides[1,2]

Weed	2,4-D	Mecoprop	Dicamba
Mustards	S	I	I-R
Nutsedge	I	R	R
Onion, wild	I	R	S-I
Ornamental plants	S-I	S-I	S
Oxalis (woodsorrel)	R	R	I
Pennycress	S	I	S
Pepperweed	S	S-I	S
Pigweed	S	S	S
Plantains	S	I-R	I-R
Poison ivy	I	R	S-I
Ponyfoot (dichondra)	S	I	S-I
Purslane	I	R	S
Red sorrel	R	R	S
Shepherdspurse	S	S-I	S
Speedwell	I-R	I-R	I-R
Spurge, prostrate	I	I	S
Spurge, spotted	I-R	S-I	S-I
Spurweed	S-I	I-R	S
Thistle, musk, curl	S	I	S
Thistle, Canada	I	I	S
Vegetables	S	S	S
Wild carrot	S	S-I	S
Wild strawberry	R	R	S-I
Wild violet	I-R	R	—
Yarrow	I	I-R	S
Yellow rocket	S-I	I	S-I

S = weed susceptible; R = resistant weeds; I = intermediate, good control at time with high rates, sometimes poor, usually require more than one treatment.

Another approach employed particularly on golf courses, is to use a postemergence application of a nonselective herbicide such as paraquat, glyphosate, or cacodylic acid prior to the warm-season turf breaking dormancy. This usually does an excellent job on annual bluegrass as well as annual broadleaf weeds present. Injury is often encountered if application is delayed until the bermudagrass starts breaking dormancy. The degree of injury is dependent on the amount of green foliage at the time of application.

Winter broadleaf weeds Important warm-season winter broadleaf weeds include common chickweed, henbit, clovers, spurweed, mouse-ear chickweed, lawn burweed, common dandelion, wild onion, wild garlic, plantains, and speedwells.

Preemergence control of some species can be obtained with benefin, bensulide, DCPA, simazine and other herbicides.

Henbit, chickweed, and clovers usually require something other than 2,4-D for postemergence control. In dormant bermudagrass and zoysiagrass, dicamba or combinations with dicamba are used often for postemergence control.

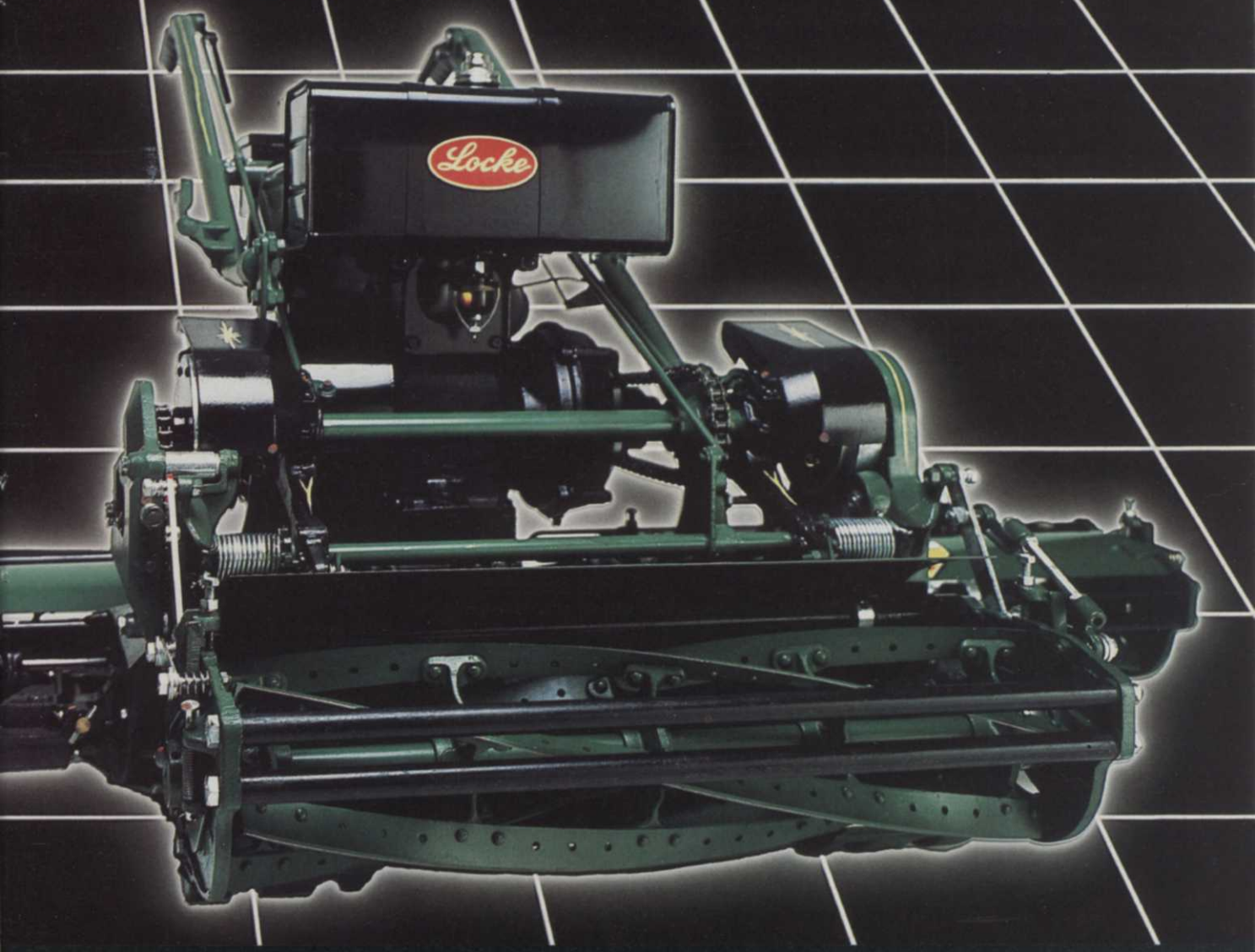
The phenoxys are safe on completely dormant turfs. Actively growing turfs vary considerably in tolerance to phenoxy materials.

St. Augustine will usually tolerate a .5 lb/A of 2,4-D with only minimal injury. At rates above .5 lb/A, St. Augustine is usually injured. This may be unimportant when using phenoxys on dormant warm-season turfs, but invariably application is made during spring transition. All turfgrasses are more suceptible to phenoxy injury during this transition period. The combination of mecoprop plus chlorfurecol is often used, especially by the homeowner on St. Augustine.

Summer grass weeds Large

continued on page 62

THE ULTIMATE MOWING MACHINE



Driven by the conviction that performance is the ultimate justification for owning a mower, Locke makes the best mowers for lawn-care professionals who demand performance, quality, and value. In a time when some manufacturing standards are questionable, Locke has made no cost-cutting changes in the manufacture of its mowing machines since their introduction in 1928. From cast iron Briggs & Stratton engines to forged steel frames and spring-loaded reels, Locke mowers are built to endure.

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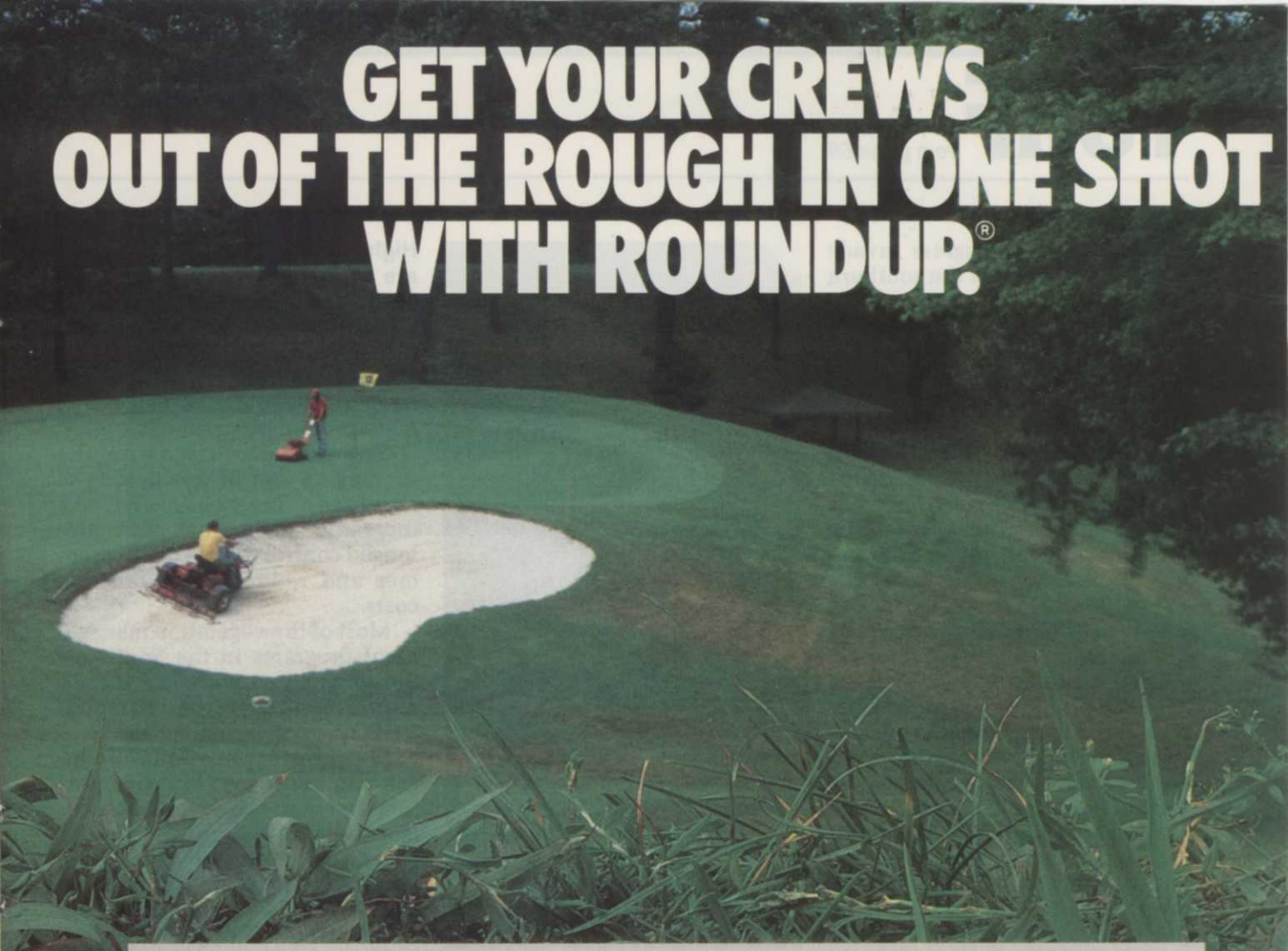

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*Based on cost of Roundup alone treating low growing vegetation.

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ALWAYS READ AND FOLLOW LABEL DIRECTIONS FOR ROUNDUP.

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Monsanto

Circle No. 151 on Reader Inquiry Card

from page 58

crabgrass and dallisgrass invade more turf acreage in the southern United States than any other grasses. Germinating seeds of both can be satisfactorily controlled with benefin, bensulide, DCPA, atrazine, and simazine. Certain formulations of atrazine are labeled for use on St. Augustine, zoysia, and centipede for sod production while other commercial products containing atrazine are labeled for homeowner use.

Only asulam is used for postemergence control of crabgrass and dallisgrass in St. Augustine. MSMA and DSMA are effective postemergence herbicides for these weeds in bermudagrass. The arsonates are used almost exclusively for dallisgrass control in bermuda and zoysia.

Goosegrass is the most difficult summer grass to control in the South. Timing of application of preemergence herbicides is of paramount importance if control is to be achieved. We generally think goosegrass starts germinating in significant quantities four to six weeks after crabgrass. However, this can and does vary.

If application of a preemergence herbicide is delayed, large crabgrass will escape because it germinates earlier than goosegrass. In bermuda and zoysia, large crabgrass can be controlled quite effectively with postemergence applications of the arsonates. Use of preemeergence herbicides would appear to be a better approach to goosegrass control than postemergence control with arsonates.

Oxadiazon (Ronstar) gives excellent season-long control of goosegrass, but it is more expensive than other herbicides. Research has shown postemergence applications of MSMA plus metribuzen (Sencor) gives good control of goosegrass.

Sandbur and bahiagrass in bermuda and zoysia can be controlled with arsenicals. There is no selective control of torpedograss

in southern turf at the present time.

Both annual and perennial sedges are problems in the South. Purple nutsedge and, to a lesser extent, yellow nutsedge are the most severe problems. Multiple applications of arsenicals or an arsenical/phenoxy combination are generally recommended for purple nutsedge, only on bermuda or zoysia. Basagran can be used for yellow nutsedge control.

Summer broadleaf weeds Broadleaf weeds are a problem throughout the South in turf, but not to the extent of the grassy weeds, such as dallisgrass, large crabgrass, and goosegrass.

Prostrate spurge and Virginia buttonweed are important and difficult to control broadleaf weeds. Multiple applications of 2,4-D plus dicamba, Trimec or Trex-San are almost always necessary. Researchers suggest the use of a nonionic surfactant with the herbicides.

Highway weed control Herbicides are being used more extensively each year on southern roadsides. Several states, including Alabama, California, Louisiana, Virginia, North Carolina, and Florida have well-developed vegetation management programs.

The primary reasons for the increasing use of herbicides in roadside management are increased safety from more prolonged control of tall growing species and reduced maintenance costs.

Most of the vegetation management programs in the South are designed to convert the turf to monostands of either common bermudagrass or bahiagrass.

Multiple applications of the arsonate herbicide MSMA, in conjunction with 2,4-D, are common. However, sulfometuron-methyl (Oust) has shown very promising results in areas having greater than 50 percent stands of bermuda at the time of application. In bahiagrass areas, diuron and atrazine have given promising results in most states.

Once the roadsides are converted to common bermuda or bahiagrass, cool-season weeds become the major problem. Tall fescue is a real problem in this situation due to its prolific seedhead production in the early spring. Winter application of glyphosate or sulfometuron have shown promise in control of this species in Alabama.

Vegetation management programs necessarily vary from state to state due to the profound differences in environmental conditions and public acceptance. However, there is no doubt that the substitution of herbicide spraying for the slower, more costly, and dangerous mowing will increase as new technology in chemicals and application methods are developed.

Weed control strategy for cool season turf

The primary preemergence her-

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RAIN BIRD®

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Rain Bird Sales, Inc., Turf Division 145 North Grand Avenue, Glendora, CA 91740 USA

bicides for grassy and broadleaf weeds in cool-season turf are benefin(Balan), bensulide(Betasan, Betamec-4, Pre-San, Lescosan), DCPA(Dacthal), oxadiazon(Ronstar), and siduron(Tupersan).

Siduron is the only preemergence herbicide that can be applied near time of seeding. Bensulide and DCPA can be applied in the spring following a fall seeding.

Benefin and oxadiazon should be applied to established turf. Bensulide can affect rooting of existing bermudagrass and caution is advised for use of most preemergence herbicides on bermudagrass greens. Thinning of fine fescue stands from preemergence herbicides has also been reported.

Preemergence herbicides should be watered in to get the chemical to the seed prior to germination. They should be applied two weeks prior to the expected germination time and should last throughout the period. Second applications may be necessary to achieve this. Contact your local extension agent for germination times for primary weeds.

The primary postemergence herbicides for grassy weeds in turf are the arsenates; MSMA, DSMA, CMA, and MAMA. Treated areas should not be reseeded for a month or more after application. See labels for delay period.

Bentgrass and fescue are more sensitive to arsonates than other cool-season grasses. CMA is the safest for bentgrass.

Weed foliage should be sprayed while still young (two to three leaf stage) if possible. The effectiveness of arsonates improves with temperature and rates need to be increased for temperatures below 80 degrees F.

The primary postemergence herbicides for broadleaf weeds are 2,4-D, 2,4-DP, dicamba(Banvel), and MCPP. Garlon(Trychlopyr) has shown promise for control of some of the more difficult-to-control broadleaf weeds, such as knotweed and yellow wood sorrel.

These herbicides should not be applied until a new lawn has had at least three mowings. The target weed weeds should be actively growing for best results. The temperature should be at least 60 degrees F. Applications during extreme heat or drought can cause severe damage to desirable turf.

Two treatments of postemergence herbicides are generally necessary to control broadleaf weeds. See labels for the proper interval between applications.

Winter annuals can be sprayed early in the year, followed by summer annuals and perennials. Fall treatment for perennials is possible.

Postemergence herbicides are often combined to achieve improved control and reduce application time.

Occasionally, a landscape manager chooses to fumigate a seedbed prior to planting to reduce weed seed, control insects and fungi, and eliminate offtype grasses. Methyl bromide(Dowfume), metham(Vapam), dazomet(Mylone) and Vorlex are used for preplant fumigation. See labels for delay period after fumigation for seeding or planting.

Renovation of turf stands is gaining acceptance, especially since the development of glyphosate(Roundup) for turf. During renovation all existing vegetation is killed and the area is reseeded in a matter of weeks. Glyphosate is deactivated within a few days following application, but a delay of two weeks is recommended. Amitrole, cacodylic acid(Phytar), and dalapon can also be used, but the delay period before seeding is longer.

Highway weed control Highway landscape managers have had two reasons to hold back on use of herbicides recently, increased sensitivity by the public to chemicals and tightened budgets. After all, mowing utilized equipment and crew on hand and did discourage tall or woody plants from blocking the view of drivers.

Roadsides are intended to be the lowest maintenance of turf areas. The need is really a groundcover which prevents erosion, does not block driver vision, and requires little to no care.

But, any area left untended for very long will return to a natural state with taller plants blocking drivers' vision. Current standard operating procedures solve these problems with the primary control being mechanical.

Weed control along fences, dividers and signs however, is predominately chemical today. Mechanical control of these areas is impractical. Nonselective, long residual herbicides are standard. A few new herbicides for these areas are on the way. Application equipment for these areas fits the needs.

Part of the problem for larger areas of turf or groundcover may be equipment. Existing chemicals for selective weed control on roadsides are effective, but the application equipment does not adequately consider drift, even distribution, or the feelings of the public regarding chemicals. Boom sprayers or the new wick-type applicators would better meet these considerations but they are impractical for use on steep slopes or embankments.

The solution for steep or difficult-access areas is a groundcover such as crown vetch. However, crown vetch, a legume, should not be sprayed with phenoxys. Drift must be watched when spraying areas where cool-season grasses are adjacent to crown vetch.

Stands of hard or tall fescue have been tried on steep slopes in the Los Angeles area with success. Other native grasses, such as buffalograss, are being used in Western Plains states to eliminate the need for irrigation. Initial selection, or even renovation in some areas, to native grasses can greatly reduce maintenance. **WT&T**

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ANNUAL BLUEGRASS
(Poa annua L.)
Low-growing, compact, tufted winter annual with flattened stems which may lie close to ground. Leaves are soft, light green and boat-shaped at tip. Can produce seed heads when mowed at ½". May die suddenly in summer.
CONTROL WITH LESCOSAN LESCO DEVRINOL, (pre-emergence).

DALLISGRASS
(Paspalum dilatatum)
Bunchy warm season perennial. Seedhead similar to crabgrass with nearly round seeds. Branch differently than crabgrass.
CONTROL WITH MSMA, DSMA (post-emergence).

- SALE ON 2,4-D -
$8.95/gallon

Order a 5-gallon can of LESCO 2,4-D for only $8.95/gallon and get a poster-size weed chart — free! Hurry! Special price and weed chart offer expires March 31, 1984.
LESCO 2,4-D also available in 55-gallon drums for just $8.65/gallon.

QUACKGRASS (COUCHGRASS)
(Agropyron repens L.)

Cool season perennial wheatgrass. Spreads extensively by long white underground stems. Leaves twice the width of bluegrass and rough-textured. Claw-like protrusion clasps the stem. Ring of root-hair every ¼ to inch along underground stem.
CONTROL WITH ROUNDUP (SPOT TREATMENT) (post-emergence).

TALL FESCUE (KENTUCKY 31, ORCHARDGRASS)
(Festuca arundinacea)
Perennial with coarse leaves forming sharp angles to stem. Grows in clumps with no creeping stems. Stiff hairs on leaves that are dull and ribbed on top, shiny beneath. Leaf veins strongly fibrous.
CONTROL WITH ROUNDUP (SPOT TREATMENT) (post-emergence).

CHICKWEED (STARWEED)
(Stellaria media)
Annual slender-branched creeping plant with smooth, pointed tender leaves and starry white blossoms. Grows best in cool, moist weather. Reduced by hot weather.
CONTROL WITH LESCO DEVRINOL, (pre-emergence) LESCO DICAMBA +2,4-D, LESCOPEX, LESCOPAR, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).

MOUSEEAR CHICKWEED*
(Cerastium vulgatum)
Fuzzy, dark, oblong-leafed perennial with hairy prostrate stems. Persists throughout summer. Flowers have five white petals.
CONTROL WITH LESCO DEVRINOL (pre-emergence). LESCOPAR, LESCO DICAMBA +2,4-D, LESCOPEX (post-emergence).

CRABGRASS
(HAIRY CRABGRASS, LARGE CRABGRASS, SMOOTH CRABGRASS, FALL GRASS)
(Digitaria spp.)
Annual. Stems mostly prostrate, branch freely, sends down roots at each joint that comes in contact with soil or moisture. Seed head divided into several finger like segments.
CONTROL WITH LESCOSAN OR LESCO DEVRINOL (pre-emergence). DSMA (post-emergence).

DANDELION (BLOWBALL)
(Taraxacum spp.)
Cool season perennial with yellow blossoms in spring which turn to fluffy seed heads. Long, thick taproot often gives rise to new shoots. Thrives in weak lawns with sparse grass. Seedlings may appear in spring, summer or fall.
CONTROL WITH LESCOPAR, LESCO DICAMBA +2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE. LESCO A,4-D (post-emergence).

DAISY
(Chrysanthemum leucanthemum)
Perennial which reproduces by rhizomes and seeds. Smooth stems which grow one to three feet high. Conspicuously lobed alternate leaves. Flower heads grow singly at end of stems. White petaled flowers with yellow disks. Especially a problem in low fertility areas.
CONTROL WITH LESCO EIGHT-ONE, LESCO TEN-ONE, LESCOPAR, LESCO DICAMBA +2,4-D (post-emergence).

CURLY DOCK
(Rumex crispus L.)
Crinkle-edged leaves with flowering stalks that may reach 2 to 3 feet in height. Perennial. Reproduces by seed, but seldom flowers in lawns. Plant forms large rosette.
CONTROL WITH LESCOPAR, LESCO DICAMBA +2,4-D LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).

GROUND IVY
(GILL-OVER-THE-GROUND, CREEPING CHARLEY)
(Glechoma hederacea L.)
Perennial. Round, scalloped leaves. Lavendar to blue funnel-formed flowers bloom in early spring. Square stems may root at joints which touch the ground. Thrives in shade but will also grow in sun.
CONTROL WITH LESCOPEX, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO DICAMBA +2,4-D (post-emergence).

THISTLE
(Carduus nutans)
Biennial, forms in rosette, spiny. Flowers large, powder puff in shape, deep rose to violet in color.
CONTROL WITH LESCO A-4,D, LESCO DICAMBA +2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).

HEALALL (SELF HEAL)
(Prunella vulgaris)

Perennial with pinkish flowers on stubby spikes with overlapping green bracts. Square stems show relationship to mint family.
CONTROL WITH LESCO DICAMBA +2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE. LESCO A-4D (post-emergence).

HENBIT** (DEADNETTLE)
(Lamium amplexicaule)
Winter annual or biennial with squarish leaves, upright plants. Early spring flowers are lavendar to blue with two lips. Funnel-formed upper leaves. Bottom leaves have stalks. Four-sided stems may bend and root.
CONTROL WITH LESCOSAN (pre-emergence) OR LESCO DICAMBA +2,4D, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).

PROSTRATE KNOTWEED*
(WIREGRASS)
(Polygonum aviculare)

Germinates in early spring. Sometimes mistaken for grass in its immature stage. Annual growing flat from long white taproot. Wiry, leafy stems. Three-cornered seeds which are first light brown then black at maturity. Individual plants may have a spread of two feet or more.
CONTROL WITH LESCO DEVRINOL, (pre-emergence), LESCOPAR, LESCOPEX, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).

LAWN PENNYWORT
(Hydrocotyle sibthorpiodes)
Creeping perennial with leaves similar to ground ivy, but smaller, brighter, shiny. Thrives in moist, shady conditions.
CONTROL WITH LESCO or DICAMBA +2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).

MALLOW
(Malva spp.)
Long, fleshy white taproot. Bluish-white flowers. Seed portion shaped like disc and breaks into numerous pie-shaped segments.
CONTROL WITH LESCO DEVRINOL, (pre-emergence) LESCOPAR, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO DICAMBA +2,4-D (post-emergence).

BLACK MEDIC (YELLOW TREFOIL)
(Medicago lupulina)
Slender, branching, spreading stems 1 to 2 feet long. Leaves have three leaflets. Flowers 1/16 inch long, yellow in dense, globular spikes on short branches from stem. Black, thick, coil seed pods with thick walls. Reproduces with seed, shallow taproot. Most noticeable in lawns, during summer.
CONTROL WITH LESCOPAR, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO DICAMBA +2,4-C (post-emergence).

MOSS
Primitive plant form with many species. Prefers cool, moist environment. Often found in shaded areas and on poorly drained soil.
CONTROL WITH LIME, COPPER SULFATE.

NIMBLEWILL (MUHLENBERGIA)
(Muhlenbergia schreberi)
Wire-like, creeping perennial which extends mats of short-bladed gray-green leaves. Tops killed by frost and are straw-colored till spring. Forms circular patches or may be distributed throughout lawn. Roots at nodes.
CONTROL WITH ROUNDUP (SPOT TREATMENT) (post-emergence).

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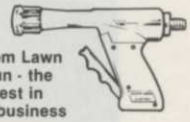

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Circle No. 133 on Reader Inquiry Card

LANDSCAPE

by Dr. Elton Smith

Rising labor costs have caused an increase in the use of both preemergence and postemergence herbicides in landscape maintenance.

The landscape manager has to control weeds around a variety of desirable plant material, including deciduous and evergreen shrubs, bulbs, annual and perennial flowers, and ornamental grasses. He uses herbicides to control weeds under trees, in sand traps, around grave markers, in patios, along fences, in plant beds and groundcover, and in containers.

The effectiveness of a weed control program depends on proper selection, calibration, calculation, and application of herbicides. Reading the label is critical to see what desirable plants may be intolerant to certain herbicides.

The weeds involved are much the same as in turf. Annual weeds, such as crabgrass, foxtail and purslane are relatively easy to control by a combination of mulching, cultivation, hand pulling, and preemergence weed control. Perennial weeds, such as bindweed, thistle, quackgrass and nutsedge, are more difficult to control because of extensive root systems.

It is important, especially with perennial weeds, to eliminate them prior to planting. There are virtually no selective postemergence herbicides to help you out when weeds take over. The variety of plant material makes it impossible for herbicides to distinguish between weeds and desirable plants. Non-selective foliage-applied postemergence herbicides can be used only with extreme care if they do not leave residue in the soil. For example, Roundup can be applied to the foliage of weeds with a wick applicator or glove.

Prior to planting

The most successful approach to a weed-free landscape is to control perennial grasses and broadleaf weeds prior to preparing the area for planting.

Spraying the weeds in an area with one of several postemergence systemic herbicides, which will be translocated to the root system for total plant control, is one of the most effective methods of control. Examples of such herbicides are 2,4-D and related products for broadleaf weed control, dalapon for grass control, and amitrole for general weed control. Each of these normally has to be applied more than once and most have a specific waiting period prior to planting. Glyphosate (Roundup), a very effective product for perennial grass and broadleaf weed control, has no soil residue.

A number of preemergence herbicides are labelled for landscape plants and two are recommended for use prior to planting. Eptam or Treflan can be incorporated into the soil, following tillage, to control annual and some perennial weeds for a period of four to six weeks. Following incorporation to a depth specified on the label, ornamentals can be

continued on page 67

LANDSCAPE from page 66

planted. This method has been used extensively by commercial nurserymen and is now being used by landscape contractors to a large extent, especially where maintenance for a specified period of time is in the contract.

Tillage as a method of weed control prior to planting is a successful practice for the control of annual weeds but not perennial weeds. In some cases, tillage only cuts up the root systems of perennials into smaller pieces and distributes them.

Following planting

In recent years the landscape industry has made extensive use of mulches to prevent weeds in the landscape.

Mulches should be applied about two-inches deep and renewed to that depth annually. Mulch layers much deeper than two inches accomplish little and may actually harm shallow-rooted ornamentals according to new research at the University of Maryland.

Many types of mulches are available, however, the most popular include hardwood, Cypress and pinebark mulches along with wood chips, peat moss, and an assortment of hulls and inorganic materials. Barks and inorganic materials will not rob nitrogen from the soil as raw organic material will. When using compost, make sure it has had enough time to fully break down during composting and weed seed in it is sterile.

Some weeds will come through the mulches. These must be hand pulled or sprayed. Seeds will be carried into planting beds by wind and birds and will often germinate in the mulch. Again, hand pulling is the most satisfactory control measure in small areas, however, landscape personnel are using more and more herbicides, such as glyphosate.

Several preemergence herbicides can be used as an alternative to, or in combination with mulches. They control annual weeds for a period of four to eight weeks. Reapplications are usually necessary to achieve season-long control depending on selection of herbicide, soil, and climatic conditions.

Typically the first appplication of preemergence herbicides should be made prior to weed seed germination. Subsequent treatments can be made as needed, based upon regrowth of annual weeds. The soil should be weed-free and moist prior to application or the treatment should be followed by irrigation or rain.

It is important to know how much area is included in the beds to be treated. Once the area is calculated, determine the amount of herbicide needed for that area based upon the label recommendations. Apply the herbicides with equipment that is properly calibrated and in good working order.

Postemergence herbicides for landscape weed control

Postemergence herbicides are used for general weed cleanup around buildings, waterways, ditchbanks, fence rows, etc. Used with extreme care, these materials may be used in tree plantings. However, avoid herbicide contact with foliage and green, yellow or immature bark.

Pre- and postemergence herbicide combinations

Preemergence and postemergence herbicides can be combined to kill existing weeds and prevent emergence of others. Combinations of paraquat or Roundup with Princep, Phytar 560, or Surflan have been used extensively in trees with excellent success. **WT&T**

continued on page 70

Calculating rates and quantities

Granular Materials

Example—A landscaper needs to treat 4,000 sq. ft. of Juniper with 4% RONSTAR granules at 4 lbs. aia. How much RONSTAR is required?

Formula

$$\text{lbs. ala} \times \frac{\text{sq. ft. to be treated}}{\text{44,000 sq. ft./acre}} \times \frac{1000}{\text{\% granular}} = \text{lbs. required to treat area}$$

Calculation

$$4 \text{ lbs. aia} \times \frac{4{,}000}{44{,}000} \times \frac{100}{4} = 9.1 \text{ lbs. 4\% granular RONSTAR}$$

Wettable Powders

Example—A landscape firm needs to treat 4,000 sq. ft. with 50% DEVRINOL wettable powder at the rate of 10 lbs. aia.

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{\text{44,000 sq. ft./acre}} \times \frac{100}{\text{\% powder}} = \text{lbs. required to treat area}$$

Calculation

$$10 \text{ lbs. aia} \times \frac{4{,}000}{44{,}000} \times \frac{100}{50} = \text{1.8 lbs. 50\% DEVRINOL W.P. to be mixed in enough water to cover 4,000 sq. ft.}$$

Liquid Concentrate

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44{,}000} \times \frac{1}{\text{lbs. active ingredient/gallon}} = \text{gallons required to treat area}$$

Calculation

$$2 \text{ lbs. aia} \times \frac{22{,}000}{44{,}000} \times \frac{1}{4} = \text{.25 or 1/4 gal. TREFLAN to be mixed in enough water to cover 1/2 acre}$$

More proof that the best costs less on tees and greens

It's as true this year as it was last.

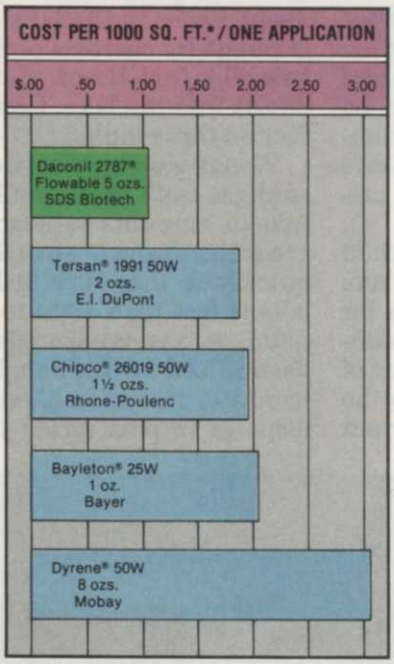
Check the chart of comparative fungicide costs and you'll see for yourself why Daconil 2787 Flowable Fungicide is more economical to use than the other leading products.

Using a typical tee and green spray schedule, Daconil 2787 gives you greater savings on a per 1000 sq. ft. basis when it comes to delivering superior control of your most serious diseases—dollar spot (including benomyl-resistant dollar spot), Helminthosporium (leafspot and melting-out) and large brown patch.

In fact, Daconil 2787 has a proven record of providing the most effective control of 10 major turf diseases.

And here are more reasons why it pays to use Daconil 2787. There's no need to add a costly spreader/sticker. Daconil 2787 already has it built in to assure you of full and even coverage for maximum disease protection.

Daconil 2787 resists wash-off. Which means it keeps on working during heavy rains or watering.



*Costs based on manufacturer suggested retail unit price as of January, 1984.

What's more, in over 15 years of continuous use, there has never been a documented case of resistance with Daconil 2787. Even on courses where it was applied at weekly intervals over many years.

The facts are there. The proof is plain to see. Daconil 2787 gives you both effective and economical disease control.

So this season, make it Daconil 2787 on your tees and greens. Because the best costs less.

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Always follow label directions carefully when using turf chemicals.

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Circle No. 164 on Reader Inquiry Card

AQUATIC

Lakes, ponds, and streams are central features to many landscapes. The best maintained landscape around a weed-infested lake is a failure. Both land and water must work together for a complete landscape.

A water feature without plants is not the objective either. Plants produce oxygen needed for a healthy, balanced water environment. The lake should be designed as you would any landscape and maintained to preserve the design.

Whereas some water plants are usually a nuisance, such as hydrilla, watermilfoil, algae, and spinyleaf naiad, others can be managed to provide an attention-getting display. These include water lily, lotus, arrowhead, cattail and others.

Control measures are limited by the desirable plants in the lake and the use of the lake water for irrigation, fish farming, air conditioning, etc. If the lake is part of a watershed area, there may be restrictions on the use of certain chemicals or weed-eating fish. Check with the extension service in your area before instituting an aquatic weed control program.

Preventative control

Aquatic weeds have the same needs as other plants; light, nutrition, and certain growing conditions. As on land, you want to encourage the desirable plants and discourage the weeds.

Typical conditions causing an aquatic weed problem are shallowness (less than eight feet deep), water in the lake does not circulate by currents or flow, and heavily-fertilized watershed drains into the lake. Concentrate first on these faults.

Weeds won't get established if sunlight can't reach the lake bottom in amounts satisfactory for growth. Banks should drop quickly so that very little of the lake is less than eight to ten feet deep. Areas where plants are desired can be kept shallow. An option to this is to plant aquatic displays in pots raised from the lake bottom.

If this is impractical, dyes or *Chlorela sp.* algae can be used to shade out the sunlight at the surface. Another method gaining acceptance is Aquascreen, a fiberglass cloth which is placed over the lake bottom where weeds are not wanted. Bottom-rooted aquatic plants will not grow through the material. It can even be placed over growing vegetation if necessary.

Algae likes stagnant, warm

continued on page 74

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It works.

OFTANOL provides the longest and most cost effective grub control available. It works so well for so long because its low water solubility helps it resist leaching to keep it in the upper soil profile. Where the grubs feed.

OFTANOL comes in two formulations: OFTANOL 5% Granular and OFTANOL 2 insecticide, a liquid. Use recommended rates and follow label directions.

OFTANOL turf insecticide. It hits grubs where they live and then they're dead. See your turf chemicals distributor.

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Applications of OFTANOL, properly timed, will control existing populations of sod webworm larvae, billbug larvae, chinch bugs, and Hyperodes weevil larvae. It works.

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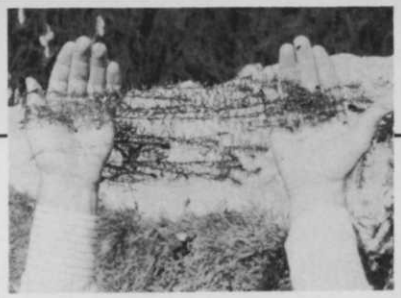
AQUATIC



Mechanical aquatic *weed harvester.*

water. A pond aerator or recirculator can be used to mix the layers of water together, keeping temperatures down and adding oxygen to the water.

Plants produce oxygen needed for a healthy lake. Decaying plants or effluent rob water of valuable oxygen. Do not throw grass clippings into lakes. If possible, remove dead plants after chemical treatments.

In certain states, various weed-eating fish are legal. These and other fish feed on lake vegetation. They are restricted from certain states for fear they might reach major rivers and lakes.

Drawdown, or lowering the water level to expose aquatic weeds to full sun or freezing temperatures is used where fish or irrigation uses are not important. Dredging can also be tried to remove plants and deepen lakes. Mechanical weed harvesters are available for purchase or rent. They cut the bottom-rooted weeds below the surface for removal.

Remember, once you decide to use chemical controls, you must protect the desired aquatic plants. Also trees with roots extending into lakes may be effected by aquatic herbicides. Preventative measures should be tried before resorting to a chemical program.

Curative control

In certain areas it is impossible to defeat all the conditions favoring aquatic weeds. In warm climates, landscape managers fight a constant battle with aquatic weeds.

In cooler climates, summer provides better conditions for aquatic weeds and seasonal control may be needed.

Algae If preventative measures aren't enough to stop algae, then copper compounds(Cutrine) are effective. Used at correct rates, these compounds do not restrict water use for swimming, irrigation, watering stock or fish farming.

If the lake has a history of algae problems, start using copper compounds as soon as water temperatures reach 60 degrees F. Periodic retreatment may be necessary for season-long control.

Copper compounds are often mixed with other aquatic herbicides for control of a variety of weeds.

Floating weeds Floating weeds are either free-floating or bottom-rooted plants which have leaves that float on the water's surface. They include hyacinths, duckweed, water lettuce, floating fern, water pennywort, and salvinia.

The primary herbicides for floating weeds are 2,4-D and Diquat.

Submersed weeds Weeds which are bottom-rooted and totally under water are called submergent. They include hydrilla, pondweed, watermilfoil, and coontail.

The primary herbicides for submersed weeds are 2,4-D, endothall(Aquathol K), Diquat and combinations of Diquat and endothall with copper.

Emersed weeds These are weeds growing in shallow areas with stems and leaves above the water surface. They include cattails, duckweed, hyacinths, alligatorweed, torpedograss and arrowhead.

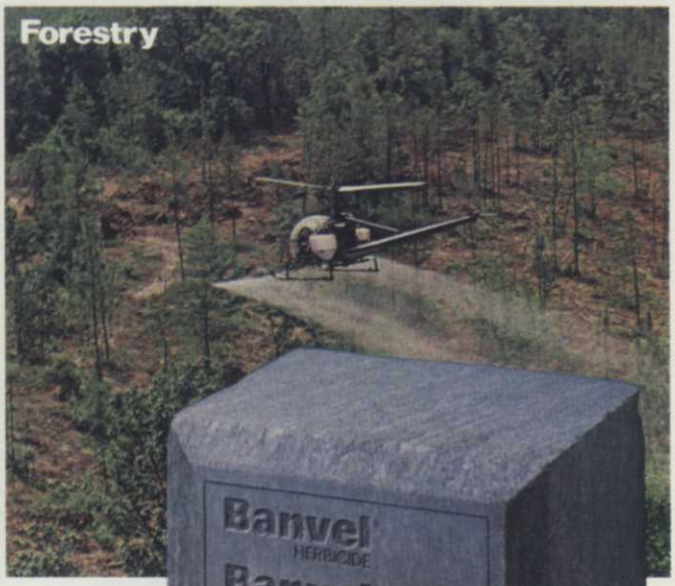
Primary herbicides for these are Banvel, 2,4-D, dalapon(Dowpon), diuron(Karmex) and amitrole.

Ditchbank weeds Emergent weeds and grasses are often problems on ditchbanks. Use herbicides listed for emergent weed. If the ditches are dry, glyphosate(Roundup) may be used. Caution should be taken to keep the glyphosate away from nearby bodies of water.

Herbicide precautions

Use of water following applications of aquatic herbicides may be restricted. Generally, copper compounds cause no delay in use. Wait 24 hours before swimming and seven days before irrigation when using endothall. Diquat requires certain delays up to ten days and should not be used in muddy water. Always check product labels for delays and precautions.

Proper calculation of the amount of herbicide is important. Rates are based on acre square feet. To calculate this figure you need to know both the area of the lake surface and the depth. Measurements should be taken rather than estimating. Multiply the area of the surface in acres by the average depth in feet. Your chemical supplier or extension agent can help you if you are uncertain of your calculations. **WT&T**



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herbicide

When you choose Banvel® herbicide products for vegetation management on roadsides, utilities, railroads, ditchbanks or in timber management, you . . .

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- Control the broadest spectrum of broadleaf weed and brush species.
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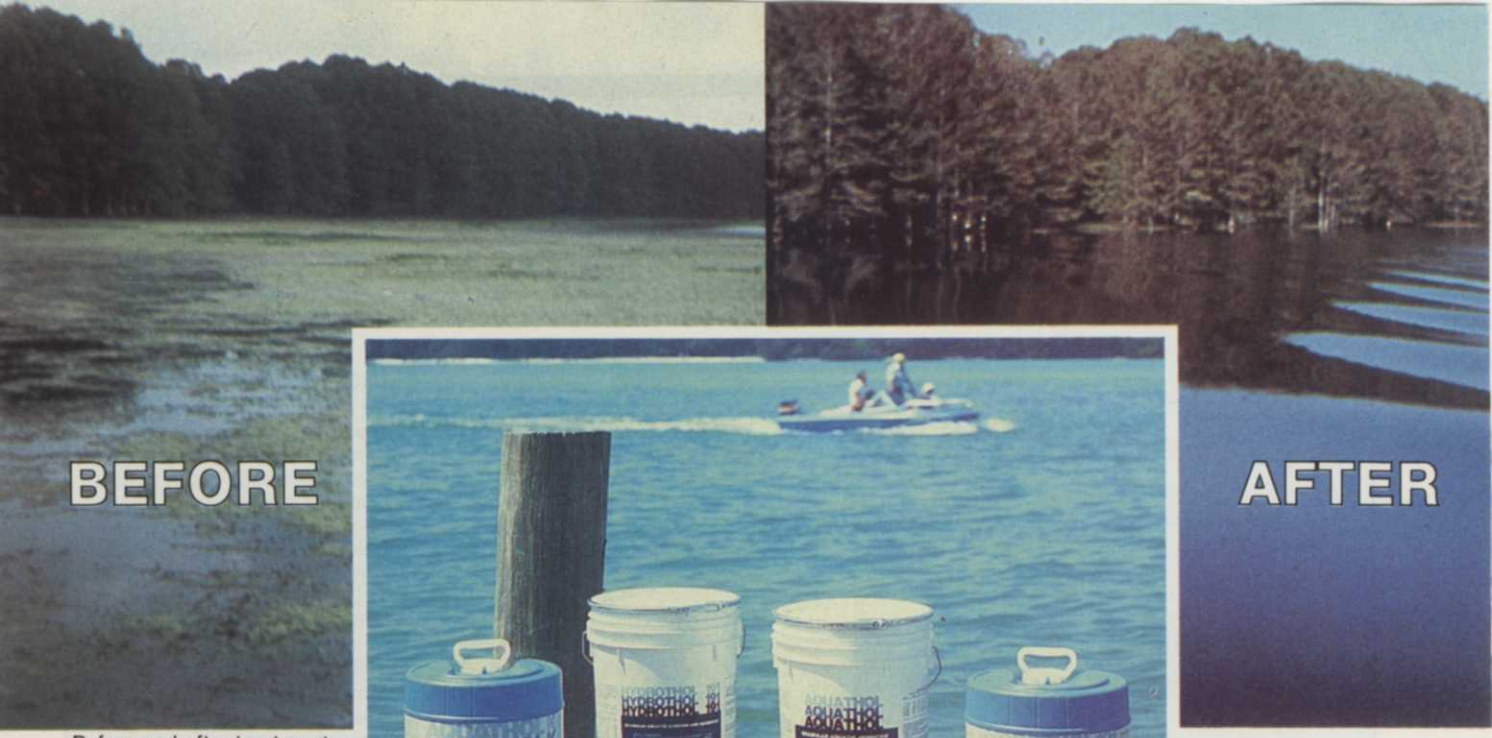
DIRECTORY

Herbicide Directory

Herbicide	Brand Name(s)	Company	Uses
amitrole	Amitrole-T	Union Carbide	Non-selective grass and broadleaf control in non-crop areas including ditches, roadsides, industrial areas and marshes.
asulam	Asulox	Rhone Poulenc	Postemergence grassy weed control for turf and ornamenals
atrazine	atrazine	Ciba Geigy	Non-selective control in non-crop areas.
benefin	Balan	Elanco	Preemergence control of annual grasses and broadleaf weeds in established turf.
bensulide	Betasan Pre-San Lescosan Betamec-4	Stauffer Mallinckrodt Lesco PBI Gordon	Preemergence control of annual grasses and broadleaf weeds in established turf and established flower gardens. Safe near tulip and daffodil bulbs.
bentazon	Basagran	BASF	Selective postemergence control of nutsedge in warm-season turf.
bromacil	Hyvar	du Pont	Nonselective control of weeds and grasses in non-crop areas. Usually mixed with diuron for roadsides and rights-of-way.
bromoxynil	Brominal Buctril	Union Carbide Rhone Poulenc	Postemergence control of broadleaf weeds in seedling turf, established turf and non-crop areas.
cacodylic acid	Phytar Rad-E-Cate	Vertac Vineland	Nonselective control for turf renovation, edging and in plant beds.
chloramben	Amiben	Union Carbide	Preemergence control in ornamentals.
chlorfurecol	Maintain	Uniroyal	Growth regulator. Also cointrols broadleaf weeds and vines.
copper	Cutrine-Plus	Applied Biochemists	Controls algae, chara and hydrilla in potable water.
dalapon	Dalapon 85 Dowpon M	SDS Biotech Dow	Selective control of perennial and annual grasses in non-crop areas and ditchbanks.
dazomet	Mylone	Hopkins Ag.	Preplant sterilant for turf and ornamental beds.



Before and after treatment for control of hydrilla with AQUATHOL® K Aquatic Herbicide.

Get results like this with Pennwalt Aquatic Herbicides

Pennwalt products control many troublesome weeds and algae, including hydrilla, coontail, milfoil and pondweeds.

Biodegradable

All Pennwalt aquatic herbicides are based on endothall. Endothall salts disappear rapidly from the water and soil through microbial degradation and do not accumulate in the food web. Properly applied, Pennwalt aquatic herbicides provide a satisfactory margin of safety to birds, mammals, and aquatic fauna. And Aquathol formulations have a wide margin of safety to fish.

Contact Action

Pennwalt aquatic herbicides kill weeds by contact. For best results, they should be applied as soon as the aquatic weed problem appears and weeds are actively growing.

Flexible Application

The application of Pennwalt aquatic herbicides can be fast, precise and economical. Application of liquid or granular formulations may be made by air, by boat or from the shore to treat small or large areas of lakes, ponds, rivers and canals.

Complete Line

The Pennwalt line of aquatic herbicides and algicides: an effective way to get rid of weeds and algae.

AQUATHOL® K Aquatic Herbicide
AQUATHOL® Granular Aquatic Herbicide
HYDROTHOL® 191 Aquatic Algicide and Herbicide
HYDROTHOL® 191 Granular Aquatic Algicide and Herbicide.

All pesticides can be harmful. Read label carefully and use only as directed.

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Circle No. 156 on Reader Inquiry Card

DIRECTORY

Herbicide Directory *continued*

Herbicide	Brand Name(s)	Company	Uses
DCPA	Dacthal	SDS Biotech	Preemergence control of annual grasses and broadleaf weeds in turf and ornamental beds.
dicamba	Banvel	Velsicol	Selective postemergence control of broadleaf weeds in turf and for noncrop control of brush.
dichlobenil	Dyclomec Casoron	PBI Gordon Thompson-Hayward	Selective weed control in ornamental beds and for total weed control on roadsides, fencerows, etc.
dichlorprop	2,4-DP	SDS Biotech	Brush control and aquatic weed control.
diphenamid	Enide	TUCO, Upjohn	Selective control of annual grasses and broadleaf weeds in bermudagrass, dichondra and around ornamentals.

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PROMINENT
creeping bentgrass

If you have been looking for a variety of Creeping Bentgrass that is available, tried and tested and found to be superior in test results...turn to PROMINENT Creeping Bentgrass.
In Illinois tests, PROMINENT out-performed other top varieties of Creeping Bent in fairway tests during the hot summertime. Plots were monitored for turfgrass quality, thatch buildup and disease resistance.
In tests in Ohio and Kentucky, PROMINENT out-performed all other bentgrass varieties tested in withstanding heat and drought conditions. For better performance under stress conditions . . . turn to PROMINENT CREEPING BENTGRASS.

- ***EXCELLENT UNIFORMITY*** • ***GOOD COLOR***
- ***QUICK TO ESTABLISH*** • ***DISEASE RESISTANT***
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New QuickJet System minimizes your service time and helps assure accurate delivery. The self-aligning quick "on/off" cap can be used with all interchangeable spray tips. The caps are available in 8 colors for color-coding different tip sizes.
QUICKJETS SAVE TIME AND MONEY.
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WEEDONE® DPC controls tough turf weeds.

Weedone® DPC

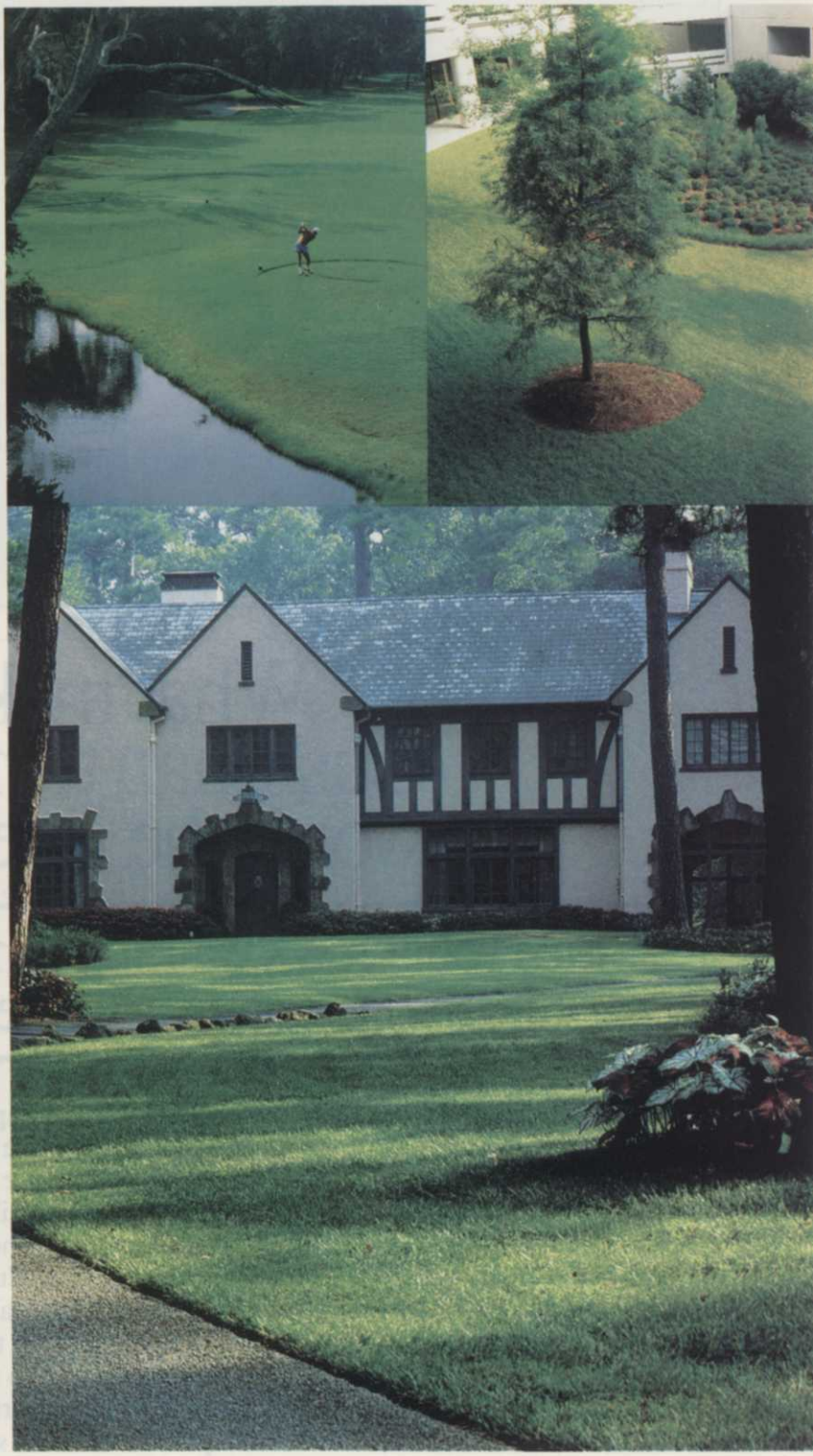
TURF HERBICIDE

Now you can get the weed-killing power of 2, 4-D and dichlorprop in one easy-to-use broadleaf herbicide. New WEEDONE® DPC turf herbicide from Union Carbide.

This broad-spectrum, post-emergent herbicide controls not only the common weeds such as dandelion and plantain, but tough weeds such as ground ivy, oxalis, spurge and chickweed; over 65 species in all.

In fact, WEEDONE DPC delivers performance equal to that of more expensive three-way mixes, and it has excellent tolerance to most grass species.

Ask for WEEDONE DPC turf herbicide. It's another quality product from Union Carbide.



UNION CARBIDE

Weedone® DPC

TURF HERBICIDE

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Circle No. 177 on Reader Inquiry Card

Herbicide Directory *continued*

DSMA	Methar 30 Ansar DSMA Liquid DSMA 81% Weed-E-Rad	W.A. Cleary SDS Biotech Drexel Vertac Vineland	Selective postemergence control of sedges and grasses in turf and ditchbanks and storage yard.
diuron	Karmex Dynex Diuron 80WP Urox	du Pont Vertac Drexel Hopkins	Generally used at high rates for nonselective total weed control in industrial sites.
diquat	Diquat	Ortho, Chevron	Aquatic weed control.
endothall	Aquathol K Endothall	Pennwalt Pennwalt	Aquatic weed control and turf herbicide and dessicant.
EPTC	Eptam	Stauffer	Selective control of annual grassy weeds, nutgrass, and perennial weeds.
Ethofumesate	Prograss	Nor-Am	For control of Poa annua and white clover in fairways.

What makes a Cushman turf vehicle worth the investment:

Turn your crew's walking time into working time. It's the fastest way to increase productivity.

If you stop to figure how much time your crew spends every week —just walking— you'd probably be shocked.

You'd also understand the economics of taking your crew off their feet and putting them into one of our tough turf vehicles.

Take the Cushman Runabout®, for instance. It carries two workers and up to a half ton of fertilizer, sand, sod or supplies.

The Runabout's 18-hp engine features a 4-stroke cycle for extra torque and longer life (a 12-hp model is also available).

For smaller needs, and budgets, consider the Cushman Turfcart™. It too can transport a pair of workers at up to 14 mph. And there's cargo space for rakes, hose, trimmers or up to 250 pounds of other supplies. The sturdy 7-hp engine can run all day on just a little gas. And a sealed-beam headlight lets the work continue into the night.

A free demonstration.

Of course the best way for you to learn about the Cushman Runabout and Turfcart is to see them in action. Right on your own grounds.

To do that, contact your Cushman dealer or call toll free **1-800-228-4444.**

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CUT4-2045

fenac	Fenac	Union Carbide	Preemergence long-term control of weeds, usually mixed with other herbicides.
fosamine	Krenite	du Pont	Brush control.
fluazifop-butyl	Fusilade	ICI Americas	Selective postemergence control of grassy weeds in ornamentals.
glyphosate	Roundup	Monsanto	Nonselective, short-term herbicide for turf renovation and total weed control along fences and plant beds.
imidazoline	Arsenal	American Cyanamid	Broad spectrum systemic industrial herbicide.
linuron	Lorox	du Pont	Short-term control of annual weeds in roadsides and fence rows.
mefluidide	Embark	3M	Growth regulator that suppresses Poa annua.
methyl bromide	Dowfume	Dow	Fumigant for pre-plant control. Also kills weed seed.

5063 Cushman, P.O. Box 82409, Lincoln, NE 68501

It works harder because it's built better.

Herbicide Directory *continued*

Herbicide	Brand Name(s)	Company	Uses
metham	Vapam	Stauffer	Preplant soil fumigant killing weeds, weed seed, insects and fungi.
metribuzen	Sencor	MoBay	Postemergence control of goosegrass in warm-season turf.
MCPP	MCPP Mecomec MCPP Chipco Turf Herbicide	SDS Biotech PBI Gordon WA Cleary Rhone Poulenc	Selective broadleaf weed control in turf. Often combined with other herbicides.
MSMA	Ansar Broadside Ansar Weed-Hoe	SDS Biotech Vertac Drexel Vineland	Postemergence selective control of crabgrass and broadleaf weeds in turf. Also, grassy weed control in ditchbanks, roadsides, industrial areas.
napropamide	Devrinol	Stauffer	Selective control of weeds in ornamental beds and containers. Experimental combination with Betasan for season-long crabgrass control in turf.
oryzalin	Surflan	Elanco	Preemergence control of weeds in established ornamentals.
oxadiazon	Ronstar	Rhone Poulenc	Preemergence control of weeds in ornamentals and turf.
oxyfluofen	Goal	Rohm & Haas	Selective control of weeds in ornamentals.
paraquat	Paraquat	Ortho, Chevron	Nonselective control of weeds in rights-of-way, industrial areas and fence rows.
pichloram	Tordon	Dow	Systemic, long-term killer of woody plants and broadleaf weeds.
prometon	Pramitol	Ciba Geigy	Nonselective herbicide with long residual for industrial weed control.
pronamide	Kerb	Rohm & Haas	Poa annua control in warm-season grasses. Also weed and grass control around woody ornamentals and Christmas trees.
sethoxydim	Poast	BASF	Postemergence control of grassy weeds around broadleaf ornamentals.
siduron	Tupersan	du Pont	Preemergence control of annual grasses in newly seeded turf areas.

continued on page 86

When there's little difference in crabgrass control

...why buy herbicides costing up to 100% more than Balan®?

For best results, always read and follow label directions.

Compare performance. Compare cost. You'll discover Balan® clearly outvalues other preemergence herbicides for lawn and golf course maintenance.

Balan delivers effective crabgrass control—similar to other products that cost up to *twice* as much. And Balan also kills goosegrass, foxtail, poa annua, barnyardgrass. Gets 'em before they get growing.

Another Balan advantage is its *predictable* length of control. So you know when to reapply and when it's safe to reseed. And that prevents wasting money on unnecessary applications or having to wait for several months before you can reseed.

Balan granules apply easily, too. Won't clog in the spreader. Assure even, uniform coverage with more particles per square foot for consistent weed control, better looking turf.

This season, depend on weed control that has been proven safe and dependable on more turfgrass for more years at much less cost: Balan—from your Elanco distributor at prices even *lower* than last year. (Also, have him show you the advantages, cost-efficiency in other Elanco turf products: Rubigan® fungicide, Surflan® and Treflan® herbicides.) Elanco Products Company, A Division of Eli Lilly and Company, Dept. E-455, Indianapolis, IN 46285, U.S.A.

ELANCO™

Turf products with benefits that make the difference.

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Balan®—(benefin, Elanco) Rubigan®—(fenarimol, Elanco) Surflan®—(oryzalin, Elanco) Treflan®—(trifluralin, Elanco)

If you think you've seen late-germinating crabgrass in your turf, you may really have been looking at a goosegrass problem.

Either way, you can solve the problem with CHIPCO® RONSTAR® herbicide.

THE DIFFERENCE BETWEEN CRABGRASS AND GOOSEGRASS.

Goosegrass is more common than you might think. It's easily mistaken for crabgrass, especially when it's mowed.

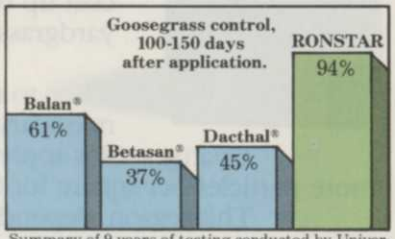
What's the difference? Check the color first. Goosegrass is a darker green. And it always grows in tufts. Crabgrass doesn't.

There's another important difference: goosegrass is much harder to control. Unless you use RONSTAR.

CRABGRASS OR GOOSEGRASS... IT MAKES NO DIFFERENCE WITH RONSTAR G.

RONSTAR is the only herbicide you can count on for effective preemergent control of both crabgrass and goosegrass.

While other products will give you satisfactory performance on crabgrass, they don't even come close to RONSTAR on goosegrass. Years of testing prove it:



Summary of 9 years of testing conducted by University Experiment Station and Rhône-Poulenc personnel.

So you have two choices. Use an ordinary crabgrass herbicide

Balan® is a registered trademark of Elanco Products Company. Betasan® is a registered trademark of Stauffer Chemical Company. Dacthal® is a registered trademark of Diamond Shamrock Corporation.

and hope crabgrass is your only problem.

Or play it safe and use RONSTAR this season, for excellent, season-long control of both crabgrass and goosegrass.

NO RAIN-OUTS, ROOT PRUNING OR PROBLEMS WITH PLANTINGS.

RONSTAR is the most convenient herbicide for your turf care program. It won't leach, so you can fit it into your schedule earlier. It's highly selective, causing no root pruning in perennial bluegrass, perennial ryegrass and bermudagrass, no harm to ornamental plantings or trees.

QUALITY CHIPCO TURF CARE IS THE "RIGHT APPROACH."

Wherever the professionals really care for turf—and especially where both crabgrass and goosegrass are problems—word is getting around. CHIPCO RONSTAR herbicide is your best choice for effective, convenient, long-lasting control.

For more information on RONSTAR or other CHIPCO products, ask your CHIPCO distributor.

Rhône-Poulenc Inc., Agrochemical Division, Monmouth Junction, NJ 08852.

RHÔNE-POULENC

RONSTAR®

SPREAD THE WORD.

Please read label carefully, and use only as directed.

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DIRECTORY

Herbicide Directory *continued*

Herbicide	Brand Name(s)	Company	Uses
simazine	Princep	Ciba Geigy	Selective control of annual grasses and broadleaf weeds in established bermudagrass. Also, used in industrial and aquatic weed control.
sulfometuron	Oust	du Pont	Non-selective industrial and selective in bermudagrass
tebuthiuron	Spike	Elanco	Total vegetation control in non-crop areas
trifluralin	Treflan	Elanco	Selective preemergence weed control in established ornamentals.
trichlopyr	Garlon	Dow	Systemic control of woody plants in rights-of-way and industrial sites. Current experiment use pending for selective turf weed control.
2, 4-D	2, 4-D	Dow, SDS Biotech, Rhone Poulenc, Vertac	Selective control of weeds in turf and numerous other areas. Usually mixed with other herbicides.
Vorlex	Vorlex	Nor-Am	Preplant fumigant Broadleaf weed control in established turf.

Herbicide Combinations

Active Ingredients	Brand Name	Company	Uses
2, 4-D plus MCPP	Chipco Turf Kleen Cleary Scotts II SDS Tee Time Lescopar	Rhone Poulenc WA Cleary OM Scott SDS Biotech Andersons LESCO	Broadleaf weed control in extablished turf.
2, 4-D plus dicamba	Scotts I Banvel Plus Lesco Selective Herbicide	OM Scott Velsicol Lesco	Selective postemergence control of weeds in turf.
2, 4-D plus MCPP plus dicamba	Trimec Trexan	PBI Gordon Mallinckrodt	Selective, broad spectrum control of weeds in turf.
2, 4-D plus dichlorprop	Weedone DPC	Union Carbide	Selective postemergence control of weeds in turf.
2, 4-D plus 2, 4-D plus dicamba	Trimec Ester	Bulkem	Selective, broad spectrum control of weeds in turf.
2, 4-D plus dicamba plus dalapon	Banvel Plus	Velsicol	Broad spectrum, post-emergence turf weed control.

WHAT'S BETTER THAN SPEED READING?

SPEED LEARNING

(SPEED PLUS COMPREHENSION)

Speed Learning is replacing speed reading. It's easy to learn...lasts a lifetime...applies to everything you read...and is the only accredited course with the option of college or continuing education credits.

Do you have too much to read and too little time to read it? Do you mentally pronounce each word as you read? Do you frequently have to go back and re-read words or whole paragraphs you just finished reading? Do you have trouble concentrating? Do you quickly forget most of what you read?

If you answer "yes" to any of these questions — then here at last is the practical help you've been waiting for. Whether you read for business or pleasure, school or college, you will build exceptional skills from this major breakthrough in effective reading, created by Dr. Russell Stauffer at the University of Delaware.

Not just "speed reading" — but speed reading-thinking-understanding-remembering-and-learning

The new *Speed Learning Program* shows you step-by-proven-step how to increase your reading skill and speed, so you understand more, remember more and use more of everything you read. The typical remark made by the 75,000 slow readers who completed the *Speed Learning Program* was: "Why didn't someone teach me this a long time ago?" They were no longer held back by the lack of skills and poor reading habits. They could read almost as fast as they could think.

What makes Speed Learning so successful?

The new *Speed Learning Program* does not offer you a rehash of the usual eye-exercises, timing devices, costly gadgets you've probably heard about in connection with speed reading courses or even tried and found ineffective.

In just a few spare minutes a day of easy reading and exciting listening, you discover an entirely new way to read and think — a radical departure from anything you have ever seen or heard about. Research shows that reading is 95% *thinking* and only 5% eye movement. Yet most of today's speed reading programs spend their time teaching you rapid eye movement (5% of the problem) and ignore the most important part (95%) *thinking*. In brief, *Speed Learning* gives you what speed reading *can't*.

Imagine the new freedom you'll have when you learn how to dash through all types of reading material *at least* twice as fast as you do now, and with greater comprehension. Think of being able to get on top of the avalanche of newspapers, magazines and correspondence you have to read . . . finishing a stimulating book and retaining facts and details more clearly and with greater accuracy than ever before.

Listen-and-learn at your own pace

This is a practical, easy-to-learn program that will work for you — no matter how slow a reader you think you are now. The *Speed Learning Program* is scientifically planned to get you started quickly . . . to help you in spare minutes a day. It brings you a "teacher-on-cassettes" who guides you, instructs, encourages you, explaining material as you read. Interesting items taken from *Time* Magazine, *Business Week, Wall Street Journal, Family Circle, N.Y. Times* and many others, make the program stimulating, easy and fun . . . and so much more effective.

Executives, students, professional people, men and women in all walks of life from 15 to 70 have benefited from this program. Speed Learning is a fully accredited course . . . costing only 1/5 the price of less effective speed reading classroom courses. Now you can examine the same, easy, practical and proven methods at home . . . in spare time . . . without risking a penny.

Examine Speed Learning FREE for 15 days

You will be thrilled at how quickly this program will begin to develop new thinking and reading skills. After listening to just one cassette and reading the preface you will quickly see how you can achieve increases in both the speed at which you read and in the amount you understand and remember.

You must be delighted with what you see or you pay nothing. Examine this remarkable program for 15 days. If, at the end of that time you are not convinced that you would like to master Speed Learning, simply return the program and owe nothing. See the coupon for low price and convenient credit terms.

Note: Many companies and government agencies have tuition assistance plans for employees providing full or partial payment for college credit programs.

In most cases, the entire cost of your Speed Learning Program is Tax Deductible.

COLLEGE CREDITS

You may obtain *2 full semester hour credits* for course completion, wherever you reside. Credits offered through Whittier College (California). Details included in your program.

CONTINUING EDUCATION UNITS

National Management Association, the world's largest association of professional managers, awards 3.0 CEU's for course completion. CEU's can be applied toward the certificate in Management Studies.

PROFESSIONAL SOCIETIES

Speed Learning is offered internationally to members of professional associations such as: American Chemical Society, Foundation for Accounting Education, Institute of Electrical and Electronics Engineers and dozens more. Consult your Education Director for information.

BUSINESS, INDUSTRY, GOVERNMENT

Many companies and government agencies offer Speed Learning as a wholly-paid or tuition reimbursement program. Consult your Training or Personnel Director for details.

learn INCORPORATED 113 Gaither Drive, Mt. Laurel, NJ 08054

HBJ1-WTT-3/84

YES! Please rush me the materials checked below:

☐ Please send the Speed Learning program @ $99.95 plus $4 postage and handling.
☐ Please send the Speed Learning Medical Edition @ $109.95 plus $4 postage and handling.
☐ Please send the Junior Speed Learning program (ages 11 to 16) @ $89.95 plus $4 postage and handling.

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Card No._____ Exp. Date_____

I understand that if after 15 days I am not delighted in every way, that I may return the materials in their original condition for a full refund. No questions asked.

Name _____
Address _____
City_____ State_____ Zip_____
Signature_____

If you don't already own a cassette player, you may order this Deluxe Cassette Recorder for only $49.95. (Includes handling and delivery.)
Check here to order ☐

Outside USA add $10 per item—Airmail extra

Herbicide Combinations *continued*

2, 4-D plus prometon	Vegemec	PBI Gordon	Selective postemergence control of weeds in turf.
Balan plus Ronstar	Regalstar	Regal Chem.	Broad spectrum preemergence control of weeds in turf.
amitrol plus simazine	Amizine	Union Carbide	Season-long control of weeds and grasses around ornamentals.
MSMA plus cacodylic acid	Broadside	Crystal	Nonselective, broad spectrum weed control.
diuron plus sodium chlorate plus sodium metaborate	Chlorea	Rhone Poulenc	Nonselective weed and grass killer.
amitrole plus fenac plus atrazine	Fenamine	Union Carbide	Pre- and postemergence control of weeds for industrial sites and rights-of-way.
bromacil plus diuron	Rout Krovar	Hopkins du Pont	Wide range control of weeds in industrial sites and rights-of-way.
MSMA plus dicamba	Mondak	Velsicol	Noncropland general weed control.
prometon, simazine and chlorate	Pramitol	Ciba Geigy	Full-season weed control in industrial sites.

Nitrogen costs money. So does water for that matter. And bluegrasses need them both.

Well, most bluegrasses.

Tests have shown that Rugby tolerates heat and drought better than most bluegrass cultivars. Rugby held its medium dark-green color and overall vigor on restricted moisture conditions. That makes *less watering* highly feasible.

A similar result happened in tests measuring the

The Way Some Bluegrasses You Wonder What

TABLE 1.

Woody plants tolerant to pre-emergence herbicides

The following evergreen and deciduous plants are labeled for use with the pre-emergence herbicides across the top of the chart. An (X) in the column indicates the herbicide can be safely used for that plant listed. The list includes only those plants with company label registration.

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Narrowleaf Evergreens												
Arborvitae		X	X	X	X		X	X	X	X	X	X
Chamaecyparis					X	X						
Eastern Red Cedar		X		X	X				X			X
Fir			X	X		X	X					
Fir, Balsam							X		X			X
Fir, Douglas				X					X	X		X
Fir, Fraser									X			
Hemlock				X	X	X	X	X	X	X		X
Juniper	X	X	X	X	X	X	X	X	X	X	X	X
Pine			X	X		X	X	X		X		
Pine, Austrian									X	X		X
Pine, Japanese Black										X	X	X
Pine, Mugo									X		X	
Pine, Red									X			X
Pine, Scotch									X	X		X
Pine, White									X	X	X	X
Spruce			X	X		X	X			X		
Spruce, Blue												
Spruce, Norway									X	X		X
Spruce, White									X			X
Yew		X	X	X	X	X	X	X	X	X	X	X
Broadleaf Evergreens												
Boxwood	X	X	X	X		X				X	X	X
Cherry Laurel					X						X	X
Euonymus				X	X		X	X		X	X	X
Firethorn	X	X		X	X					X	X	X
Holly	X	X	X	X	X	X		X		X	X	
Holly, Japanese						X				X	X	X
Japanese Pieris			X			X		X			X	X
Leucothoe		X				X				X	X	
Magnolia grandifolia										X	X	
Mahonia					X		X		X	X	X	
Mountain Laurel		X	X		X		X				X	X
Rhododendron		X	X	X	X	X	X	X		X	X	X

continued

need for nitrogen. Rugby scored well at low to moderate nitrogen fertility levels. And maintained good turf quality and density under no-nitrogen conditions.

In short, Rugby needs *some* nitrogen, but it doesn't need to wallow in it. So you can spend your time and money where it does more good.

But not on extra fungicide. Rugby resists Fusarium blight, leaf spot, dollar spot, stem rust, and powdery mildew.

Rugby also offers you the benefits of a low growth habit. And only the *blades* grow vertically. So mowers clip the leaf ends only, not the crucial growth-sustaining lower stems.

With Rugby, you can have rich, dense Kentucky bluegrass. For less nitrogen. Less water. And less time.

That's nothing to snort at.

Rugby
KENTUCKY BLUEGRASS
For low maintenance turf

Circle No. 161 on Reader Inquiry Card

Devour Nitrogen, You're Raising.

DIRECTORY

TABLE 1.

Woody plants tolerant to pre-emergence herbicides

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Deciduous Trees												
Ash		X	X	X	X					X		
Ash, White					X			X				X
Bald Cypress					X							X
Beech					X							
Birch		X	X		X		X			X		
Birch, European												X
Chinese Chestnut			X		X							X
Corktree, Amur		X										
Crabapple		X	X	X	X					X		X
Dogwood		X	X		X	X		X	X	X		X
Dogwood, Kousa												X
Elm		X	X									
Elm, American									X			
Elm, Siberian									X			
Ginkgo										X	X	
Goldenchaintree		X		X								
Goldenraintree		X									X	
Hackberry		X										
Hawthorn			X	X								
Honeylocust				X					X			X
Linden		X				X						
London Planetree												X
Magnolia		X	X			X	X	X		X		
Maple		X	X	X	X	X	X					
Maple, Amur										X		
Maple, Norway												X
Maple, Red								X				X
Maple, Silver												X
Maple, Sugar					X							X
Mountain Ash		X										
Oak		X	X		X	X				X		
Oak, Pin												X
Oak, Red								X	X	X		X
Oak, Scarlet												X
Poplar		X	X	X	X		X					
Redbud			X		X							X
Russian Olive		X	X		X				X	X		
Sassafras								X				
Sweetgum			X		X						X	X
Sycamore			X		X							X
Tuliptree			X		X							X
Tupelo												X
Walnut		X	X	X	X							X
Willow		X	X		X							X

Vermeer Tree Spades: More operating room. More digging torque. More tree and ball.

- New, compact, short tower design. Gets you closer, easier, faster, with more operating room for tree and ball.
- Most powerful drive system in the field.
- Convenient sales/service centers all over North America.

Discover the "New Generation" of Vermeer Tree Spades today and win up to $5,000 cash in the Vermeer "New Generation" sweepstakes. Contact your local Vermeer dealer today.

*Call toll-free 1-(800)-247-2347**

Vermeer

8803 New Sharon Road ● Pella, Iowa 50219

**In Iowa, call collect (515) 628-3333*

A New Generation

Circle No. 179 on Reader Inquiry Card

VORLAN™

Setting new course records for disease control

Vorlan is the newest turf fungicide from Mallinckrodt.

It's so good even the old pros are praising it.

On golf courses and in university trials, Vorlan has been consistently setting new records in the control of Dollar Spot (even resistant strains!), Leaf Spot, Red Thread, and Pink Snow Mold. It's great both as a curative and a preventive.

As a bonus, it takes so little Vorlan to be effective — and it provides such long-lasting control — it also sets new records for economy.

If you haven't tried Vorlan, you should. Call toll-free for more information, or contact your Mallinckrodt Turf Products distributor. And act now, to set your own course record for disease control!

Mallinckrodt®

P.O. Box 5439
St. Louis, MO 63147
(800) 325-7155

Circle No. 138 on Reader Inquiry Card

DIRECTORY

TABLE 2.
Ground covers tolerant to pre-emergence herbicides

	BETASAN	DACTHAL	DEVRINOL	ENIDE	EPTAM	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Ground covers										
Ajuga	X		X		X			X		
Boston Ivy		X								
Cotoneaster		X		X		X	X	X	X	X
English Ivy	X	X	X	X	X	X		X	X	
Euonymus		X		X		X		X	X	X
Honeysuckle		X		X						X
Juniper	X	X		X		X	X	X	X	X
Liriope			X						X	
Myrtle	X		X	X	X			X	X	
Pachistima		X								
Pachysandra	X		X		X			X		
Potentilla										X
Sedum	X				X			X		
Stonecrop									X	
St. John's Wort	X		X	X	X					

TABLE 3.
Dediduous shrubs tolerant to pre-emergence herbicides

	BETASAN	CASORON	DACTHAL	DEVRINOL	ENIDE	EPTAM	FURLOE CHLORO IPC	ORNAMENTAL WEEDER	PRINCEP	RONSTAR	SURFLAN	TREFLAN
Deciduous Shrubs												
Abelia	X		X	X							X	
Azalea	X	X	X	X	X	X		X		X	X	X
Azalea, Mollis		X										
Barberry		X	X		X	X	X		X	X	X	X
Beautybysh		X			X							
Cinquefoil												X
Cotoneaster		X	X		X			X	X	X	X	X
Currant			X		X							
Deutzia		X										X
Dogwood, Red Osier										X		
Euonymus, Winged		X	X	X	X	X				X	X	X
Flowering Almond		X										
Flowering Quince		X										
Forsythia		X	X		X		X			X	X	X
Hibicus				X	X						X	
Honeysuckle		X	X		X		X		X	X	X	X

What makes Ryan® big aerators worth the investment:

Large area cultivation plus five choices of tines to get to the root of your problem fast.

Chances are, your turf is slowly choking to death.

Every time you cut grass, it gets harder for water and fertilizer to seep down through the thatch build-up.

And every time your soil is walked on, or dried out by hot weather, it gets harder for the grass to breathe.

And for new grass to take root.

Ryan has the solution.

Ryan solves your turf problems with an aerator specifically built for your type of turf.

On fairways, parks and other uneven grounds, we offer the Ryan Renovaire®.

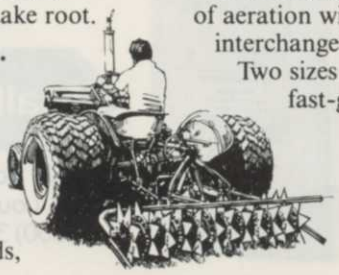
To aerate flat expanses of turf (like athletic fields), choose the Ryan Tracaire®.

Both cover a wide 6-foot swath.

Both can be mounted to your tractor's 3-point hitch.

And both let you vary the amount of aeration with a unique system of interchangeable tine wheels:

Two sizes of **coring** tines for the fast-growth weeks of spring.



The Ryan Tracaire — built specifically for athlethic fields and other flat grounds.

Two sizes of **deep-slicing** tines to open up dry soil in the summer.

And **open-spoon** tines to prepare the turf for new seed and fertilizer in the fall.

No other equipment gives you such thorough aeration, season after season.

A free demonstration.

Of course, the best way for you to learn about the Ryan Tracaire and Renovaire aerators is to see them in action.

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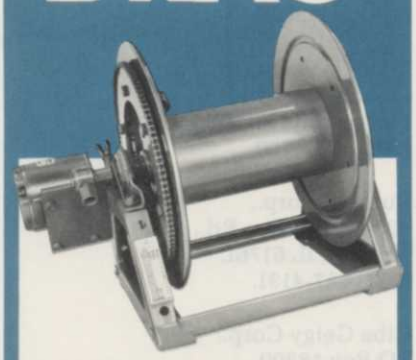

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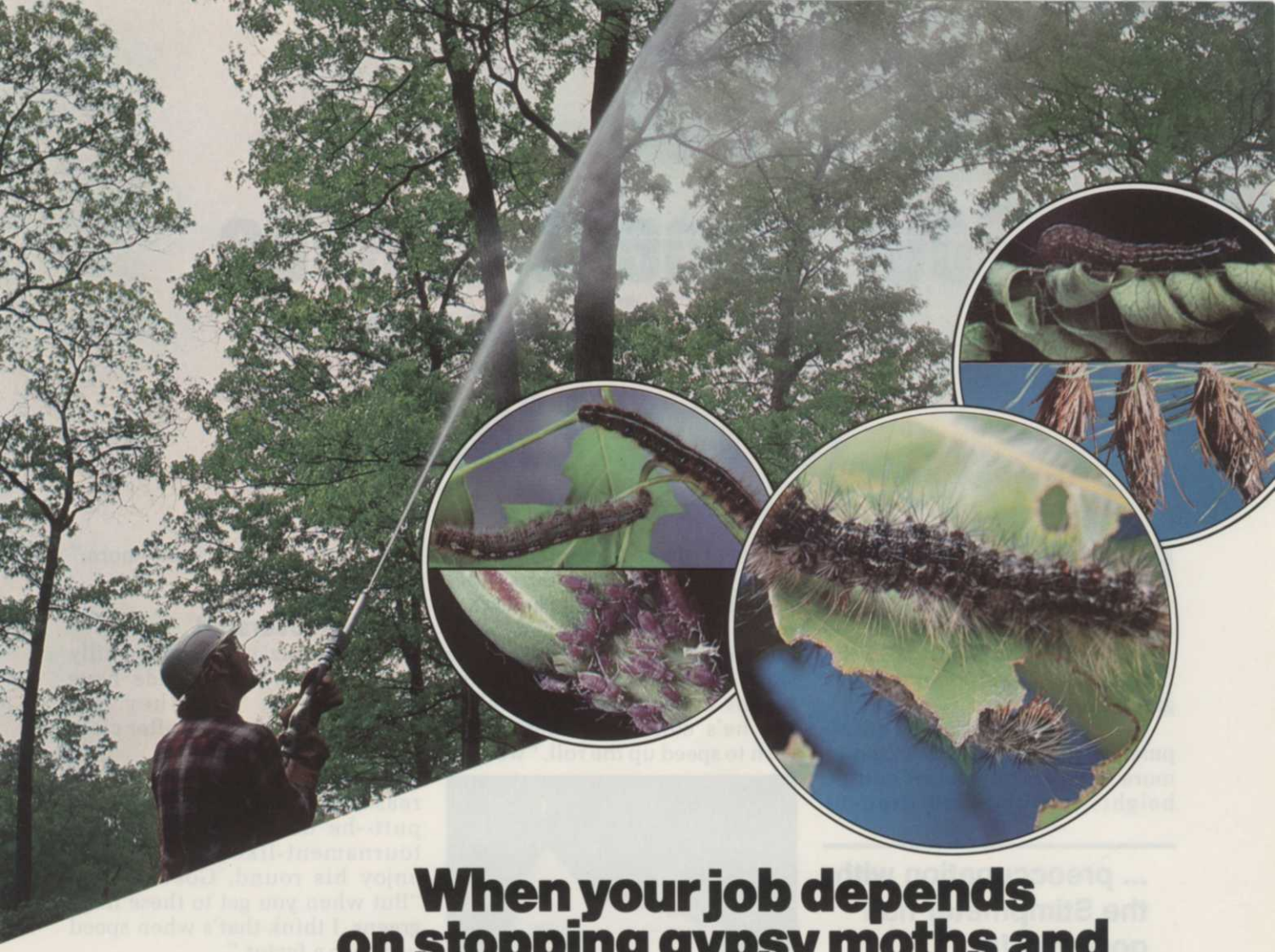

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Circle No. 108 on Reader Inquiry Card

Tournament Speeds Push Greens to the Limit

by **Kevin Cooney**, assistant editor

For the sake of members who want their putts to roll "the way they do on TV," superintendents have spent the past decade or so pushing grass plants to the limit in the pursuit of ever faster green speeds.

Increased attention to Stimpmeter readings have resulted in more cross-cutting, lower cutting heights and induced drought practices to give putters a snappy roll as they try to save par.

... preoccupation with the Stimpmeter has gone too far.

Sherwood Moore, whose Winged Foot Golf Club was named one of the top ten courses in the country by *Golf Digest*, has been quoted as saying he believes preoccupation with the Stimpmeter has gone too far. Unless superintendents start easing off green speed, Moore believes troublesome problems will pop up within a few years.

But what are the long-term impacts of these cultivation methods? Long range studies on green speed practices have not been conducted, but Jim Snow of the United States Golf Association Green Section said he's noticing some things that may be connected to high speed cultivation practices. Snow said he's observed an increase in moss on northeastern greens in the past year, and he believes this may be partly due to superintendents' efforts to please their members.

"In the next few years we'll probably see more moss and other problems," associated with increased stress on greens, he said. Snow agrees that faster greens are generally desirable, but he's concerned that in the rush to speed up the roll, "we may be going too far" and compromising turf quality for the sake of quickness.

"I caught so much grief I don't do it (encourage fast greens) anymore."
—Tom Goetz II

Tom Goetz II, superintendent of the Manufacturers Golf and Country Club, Orland, PA, doesn't worry about green speed on his course. After increasing his green speeds several years ago, "I caught so much grief (from members) that I don't do it anymore," he said.

Concept oversold

Many of Goetz' greens in the hilly Pennsylvania countryside have slight slopes, "and they just couldn't hold the ball" after close cutting, he explained.

The average player just wants a reasonable chance to sink the putt--he doesn't have to have tournament-like conditions to enjoy his round, Goetz noted. "But when you get to these huge greens, I think that's when speed becomes a factor."

At any rate, Goetz believes the concept itself is oversold.

"The average player just wants a reasonable chance to sink a putt ..."
— Goetz

"Sometimes, when I talk to other superintendents, the first thing they ask me is 'how fast are your greens,' like it's a big point," he said.

It is a big point to Wayne Zoppo, whose clients at Agawam Hunt in East Providence, RI, feel high green speeds "are very important."

Since 1972 Zoppo has topdressed his greens four times a year, increased verticutting and kept his mowing height down to 3/32. Zoppo's proud of the fact

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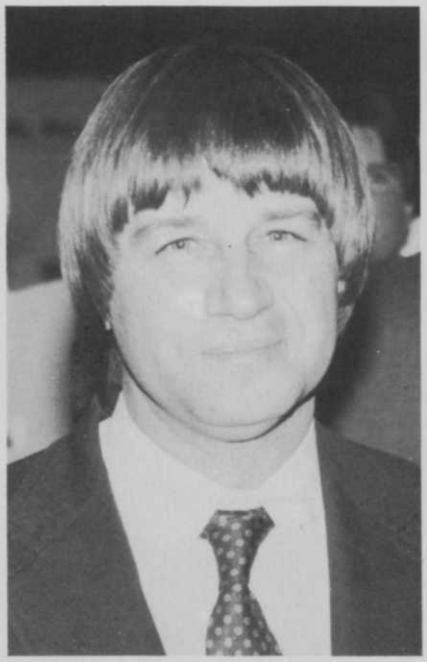


"Everything you do (for faster greens) has to be fine tuned to head off disease.
—Wayne Zoppo

that his greens averaged 10.5 feet on the Stimpmeter during the 1983 season.

Any problems? "None," Zoppo says.

The only thing he does differently now is use putting green mowers "a lot more often" to cut the circles of greens instead of his hydraulic machines.

The only problem Goetz encountered when he worked for speed was wheel rings on the green from his triplex mowers, he said.

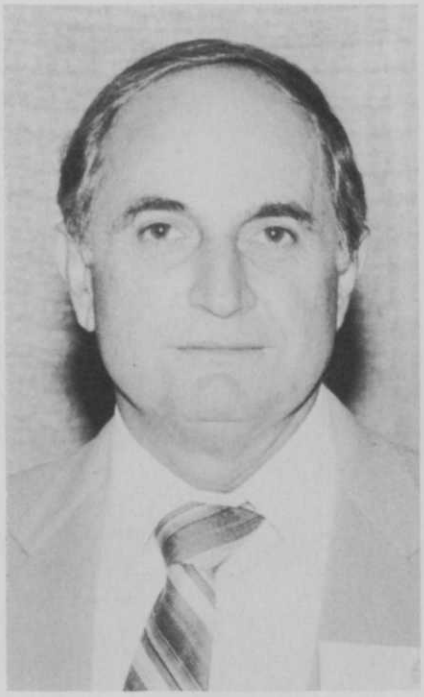
But "everything you do has to be more fine tuned," to head off disease problems, Snow said. Someone should be on the course every day checking those low-cut greens and have the expertise, time and equipment to quickly respond to deficiencies. Snow warned that the increased cost and expertise required to properly maintain fast greens, "may leave a lot of fellows unprepared" to care for their courses properly.

Penn State University's Dr. Joe Duich has done extensive research on green speed, and his tests identify lower cutting heights and reduced fertilization rates as the most predictable ways to boost ball roll.

Middle ground

Duich too, has called for moderation in the race for the fastest green on the block, and reminds superintendents to strive for consistent playing speeds across the entire course and not simply the fastest surface they can muster.

Rather than shoot for the ever-faster green, "Raise it (the cutting height) as high as your membership will permit," bermudagrass expert Glenn W. Burton said flatly. "As a general principle, mowing that close is bound to weaken that plant, and I think, likely to increase its susceptability to increased wear damage and other diseases."



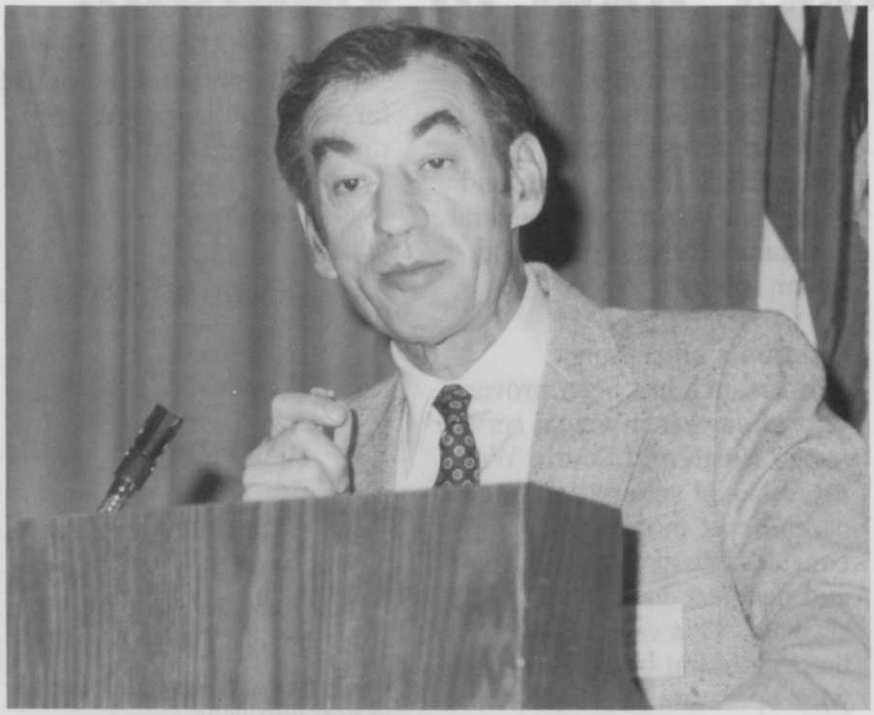
"We have no problems whatsoever with keeping greens fast."
—Tony Caranci

He echoed Snow's suggestion about checking the greens closely every day during the season to try and head off problems. While noting "if the plant had its way, you'd never cut it," Burton observed, "the turf is out there for the game of golf—we have to satisfy that golfer."

One way to help close-cut plants, he noted, is to raise cutting heights as far as possible in the autumn to help quick recovery the following spring. Burton also said increased autumn watering will help the plant rest easy during the winter.

Tony Caranci, superintendent at the Ledgemont Country Club in Seekonk, MA, keeps moisture in

continued on page 126



"Strive for consistent speed across the entire course."
—Dr. Joe Duich

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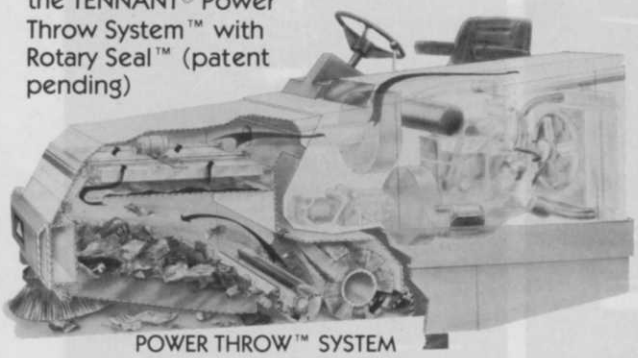

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Circle No. 170 on Reader Inquiry Card

Simplified Calibration of Boom Sprayers

by **Bruce Branham**, assistant professor,Michigan State University, East Lansing, MI

Accuracy and economy are two major reasons for increased attention to sprayer calibration today. Overapplication and drift lead to waste and possible damage. Underapplication prevents chemicals from doing their job and wastes time and money in reapplication or touch-up.

You may be doing everything right as far as mixing, calculation and application, but your equipment may need adjustment.

The introduction of foam and dye marking agents is helpful and may reveal problems with spray equipment. However, it's very important to check spraying equipment regularly for accuracy.

A basic understanding of spray equipment, spray nozzle patterns, and flow rates can help you keep your spraying equipment accurate and reliable.

Nozzle selection

With a regular flat fan nozzle, commonly used in agriculture, you have to overlap to get even coverage of a chemical.

A hollow cone nozzle is used where thorough coverage is needed, such as for fungicide applications. This nozzle is effective in drenching leaves during application.

The two nozzles used most often in turf are the flooding flat fan and the raindrop nozzle.

The flooding flat fan is not a very uniform pattern and must be used with large gallonages of water. It is used in turf for applying fertilzers and fungicides applied in large amounts of water.

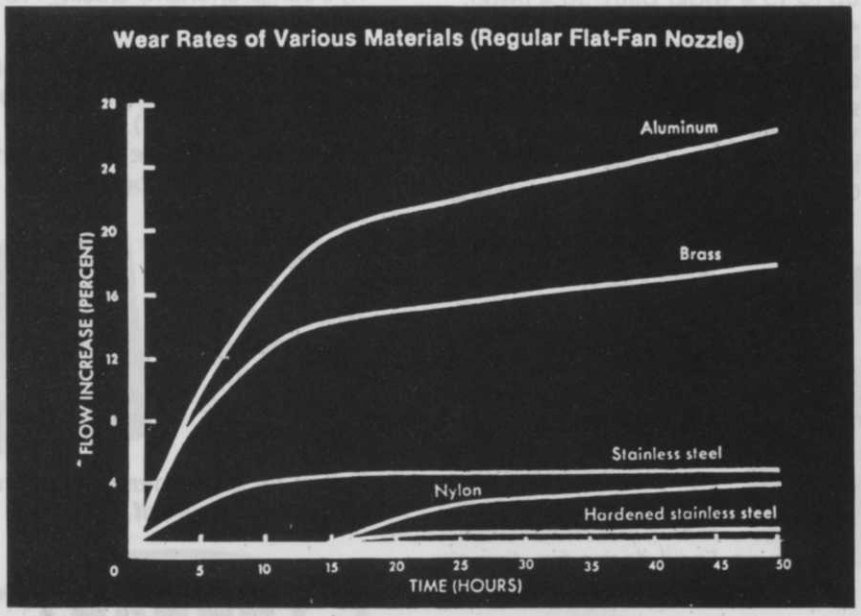
The raindrop, a new type of nozzle, is like a hollow cone but modifications allow you to spray at a reduced pressure and still provide a very good pattern. This nozzle will reduce drift compared to a normal flooding flat fan nozzle since it can be used at lower pressure. It is good for applying herbicides.

For example, the regular flat fan is made to operate at 20 to 40 pounds per square inch(psi). At 40 psi the nozzle produces a fair amount of very fine particles which are subject to drift. The new raindrop nozzle is designed to provide the same distribution at 15 psi as the flat fan nozzle at 40 psi. The result is larger particles and reduced potential for drift.

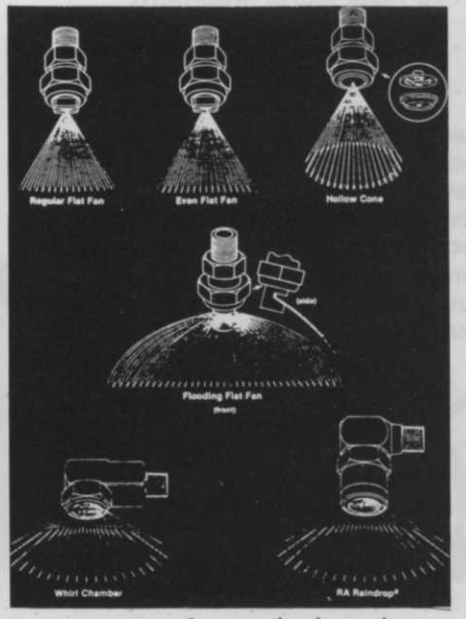
Tests performed at Michigan State University have shown that the pattern of a flooding flat fan nozzle is not very uniform and requires a 100 percent overlap with a boom sprayer.

A flat fan nozzle has a bell-shaped distribution which provides a nice straight uniform pattern with a boom sprayer. Overlap with a flat fan nozzle should be 30 to 50 percent.

Overlap is determined by comparing the distance nozzles are apart on the boom with the width of the pattern on the ground. One hundred percent overlap means the the width of the pattern on the



Nozzle wear *by type of material.*



Spray patterns *for standard nozzles used in turf and agriculture.*

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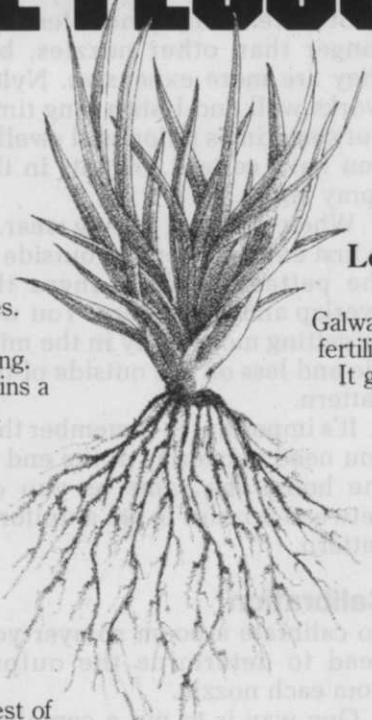

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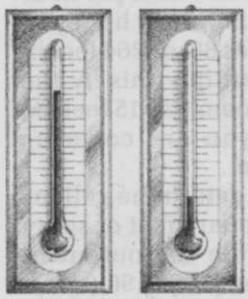

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Tests have shown that it won't succumb to brown patch or net blotch. And that its improved shade tolerance makes it well suited for use under trees and in other low-light areas.

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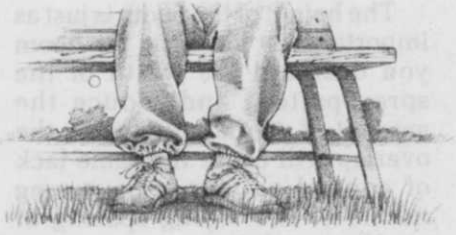
Galway requires only limited amounts of water and fertilizer to produce an attractive, dark green turf. It grows slower, which means less mowing. And its improved fine-leafed texture improves density and uniformity.



It is recommended for athletic fields, parks, playgrounds, commercial and public turf areas, boulevards, embankments and home lawns. New, fine-leafed Galway from Northrup King. It'll change your thinking. Because, in the world of tall fescues, it stands above them all.

Ask your Northrup King distributor about Galway tall fescue. Or write Northrup King Medalist Turf Products, P.O. Box 959, Minneapolis, MN 55440.

MEDALIST TURF PRODUCTS

Circle No. 152 on Reader Inquiry Card

Hand-held device *measures flow from a single nozzle instantaneously.*

ground is twice the distance the nozzles are apart on the spray boom. You can determine this by closing all the nozzles but one on the boom and checking the width of the spray on the ground.

When you don't have proper overlap there will be strips between nozzles where the dose isn't high enough to provide control.

The output of a brass nozzle changes in less than 20 hours of spraying.

The height of the boom is just as important. By lowering the boom you decrease the width of the spray pattern and reduce the amount of overlap. Reducing the overlap will cause the same lack of control as using the wrong nozzle or the wrong spacing of nozzles on a boom.

Nozzles will wear down with time and allow more material through. This depends on the material the nozzles are made of. The flow of material will increase from the nozzle as it is used. If you spray a great deal you will be changing the gallonage you put down.

Standard nozzles are made of brass. Studies show that flow increases about 16 percent after 20 hours of spraying. After 50 hours the flow increases 20 percent from its original rate.

Wettable powders will wear open the nozzle orifice faster than other materials.

Stainless steel nozzles last longer than other nozzles, but they are more expensive. Nylon works well and lasts a long time, but sometimes nylon will swell if you have certain solvents in the spray tank.

When you start getting wear, it is first exhibited on the outside of the pattern. This changes the overlap and the pattern. You will be getting more spray in the middle and less on the outside of the pattern.

It's important to remember that you need to overlap at the end of the boom the same as you do between nozzles to get a uniform pattern.

Calibration

To calibrate a boom sprayer you need to determine the output from each nozzle.

One way is to put a container under each nozzle, turn the sprayer on for 30 seconds, and measure what is in each container. The output of each nozzle should be within five percent of the average output of all the nozzles. Nozzles that don't meet this requirement should be removed and cleaned or replaced. Never use a metal object to clean out a nozzle orifice. Use a soft wooden toothpick. Once a nozzle is cleaned, test it again.

A device is now available which quickly measures the output from each nozzle, one at a time. It is placed under the nozzle and reads the flow rate in seconds. It's like a hand-held calculator with a tube.

The device shows output in gallons per minute. It is accurate to one hundreth of a gallon and costs about $70 dollars. It's much faster to use than the standard method.

A simple, hand-held meter makes sprayer calibration much simpler.

There are many ways to determine the output per thousand square feet to check application rates. The easiest way is first to figure how much water is coming out of one nozzle per unit time (in gallons per minute). Multiply the output of this nozzle by the number of nozzles on the boom. This produces the total output of the boom in one minute.

Now you have to determine how much area you cover in one minute of spraying. First determine your width of spray and travel speed. You know how wide the boom is. If you know rate of speed you can figure 88 ft. per minute for each one mile per hour speed. At three miles per hour you cover three times 88, or 264 feet in one minute. Multiply this by the width of your boom, say 15 feet. So each minute you are covering 3,960 square feet.

You want to determine gallons per thousand square feet of spray applied, so divide the output in gallons per minute by 3.96 (thousands of square feet). Since you know the volume of solution applied and the amount of chemical per gallon in the tank, you can determine the amount of chemical applied per thousand square feet.

You should check your sprayer output peridically to see if it has changed. Remember, nozzles wear down in just hours of spray time. **WT&T**

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Imagine winding, narrow berms. Steep embankments. Overgrown sidehills. Tree-lined fairways.

Now imagine a self-propelled mower designed specifically to help you tackle them. That's the new commercial walk-behind mower line from John Deere.

All four of these new John Deere mowers are made to get around in small spaces or large open areas and work on grades to 25°. With a low silhouette deck that lets you mow under trees and shrubs.

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Look into one of these new John Deere walk-behind mowers.

It may be just the answer for your tough mowing jobs.

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Circle No. 116 on Reader Inquiry Card

Practical Guide to FLOWERS in the Landscape

by **Ann Reilly,** consumer affairs manager, Bedding Plants Inc.

Geraniums *in Seattle's Freeway Park provide a warm and inviting contrast to green foliage.*

Real men don't like to work with flowers. Just saying the words dahlia, impatiens, marigold, pansies, or petunia makes them cringe.

The fact is the popularity of bedding plants has grown greatly in the past decade. Managers of commercial, institutional and recreational facilities want flower beds in front of buildings, in parking lots, on tees, and in parks.

Questions about the labor and maintenance involved with planting annual flowers are constantly being raised, especially from those who have not dealt with them before.

These questions cover the gamut of flower bed design, plant selection, planting and care. What annuals are best for dry soil...wet soil...hot locations...shaded locations? What are the best low maintenance annuals?

Design

Design limits are set by available space, size, soil conditions and light. Keep plant heights in proportion to the size of the flower bed and surroundings. Low-growing flowers do best in small spaces.

Varying sized flowers should be chosen where height is needed, in expansive plantings, or against tall backgrounds. Three different heights of bedding plants are recommended; ground cover in front, tall flowers in the background or center, and medium tall plants in between.

There are three basic plant shapes; spikes, mounds, and ground covers. A mixture of all three is most interesting.

Color is very important. Choose a prominent color and carry it throughout the design in different shades and tones. Colors should compliment each other. A color wheel will help you select combinations.

Use bright colors, such as red and orange, with discretion since they attract the eye. Warm tones of red, orange and yellow are exciting colors, whereas blues and violets are more tranquil and make the garden appear larger.

Planting plans should include spacing between annuals. For example, if plants are eight-inches apart, each plant will occupy 64 square inches of bed space. Divide the area to be planted (in square inches) by 64 to determine the number of plants needed.

Planting

Order plants in advance from your local bedding plant supplier. It is possible to find a local grower willing to grow your bedding plants under contract.

Prepare planting beds in advance, incorporating peat moss or other organic matter and a complete fertilizer such as 5-10-5 into the soil at that time.

Water both the planting bed and the plants well before planting, and set them in the ground at the same level at which they grew in the pack or flat. It helps to plant annuals on a cloudy or overcast day to reduce transplant shock.

A drip irrigation system provides the easiest maintenance system and use the least amount of water.

A two-inch layer of mulch of shredded leaves, pine needles or bark will not only add an attractive touch, but will conserve water and reduce weeds.

If space is limited, consider container plantings and hanging baskets. For containers use a dwarf, compact variety that will compliment the size and color of the container. **WT&T**

21 Popular Annuals for Landscapes

Ageratum—Small fuzzy blooms of blue, violet or white that fall cleanly and don't need to be pinched when faded. Do well in full sun or part shade. They do well by themselves as a carpet of blue or white or as edging to larger growing plant material. They grow 6 to 12 inches high, stay compact, and are a good contrast to pinks and yellows. Plant only in the spring or fall in hot, humid areas. Recommended varieties are Blue Blazer, Blue Puffs, North Seas, Blue Danube, or White Spindrift.

Begonia—Popular for shade. Non-stop flowers of white, pink or red over green or bronze leaves. Modern wax (or fibrous) begonias will do well in the sun provided they receive more water than normal and the temperature generally doesn't exceed 90 degrees F. Where heat and humidity are high, choose the bronze-leaved types. Varieties include Scarletta, Scarlanda, Bingo, Mars, Vodka, Whiskey, Gin and Brandy. White or pink Avalanche begonias are outstanding for hanging baskets.

Browallia—Little-known browallia makes an ideal low-growing, trailing annual for the shade. It likes cool, moist situations. Flowers are star-shaped in blue and white. Varieties include Blue Bells, Marine Bells, or Silver Bells.

Celosia—The plumed or crested type of this brightly-colored flower will add a touch of fire to the landscape. Due to its startling color, celosia needs to be used in careful and limited amounts. Don't plant too early because cool temperatures force it to go to seed and discontinue flowering. Look for Apricot Brandy, Jewel Bow or Geisha.

Coleus—Great for shade and under trees. Fast and easy to grow, coleus leaves can be shades of green, yellow, red, pink, and white with blotched, mottled or striped patterns. Pinch off flowers in later summer to keep the plants vigorous through fall. Dwarf types are Carefree, Wizard, and Saber. Larger types are Rainbow,

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Dragon, and Fijis. For containers plant Carefree and for baskets plant Saber mix or Scarlet Poncho.

Dahlia—For a multi-colored mass planting, dahlias grown from seed make a good display. Using tubers instead of seed is labor intensive. Seed varieties, generally dwarf and mixed colors, can be dug each year and saved but reseeding is easier. Popular varieties include Rigoletto, Redskin, Unwins, and Figaro.

Dianthus—Often known as pinks and sweet williams, dianthus are becoming more resistant to heat. The Charm series, Queen of Hearts, Princess Scarlett and Snowfire will give the best, low growing, compact performance.

Dusty Miller—The silver, grey and white tones of the leaves of dusty miller make it a useful filler and buffer between flowers or plants of contrasting color. It tolerates heat, drought, and light shade. It's effective in areas used at night, reflecting artificial lights and moonlight. Remove flowers if they begin. Try the varieties Silver Dust or Silver Lake.

Geraniums—Geraniums prefer sun, lots of water, freqent feeding and removal of dead flower heads. They are not a low-maintenance flower. They are grown from cuttings or from seed. Select cutting types for containers and seed types for beds. In hotter areas, seed types are more resistant to heat stressand do not fade as much.

Lighter colors are better in parking lots and other areas used at night. Pastels and bicolors are good for up-close areas. Salmons and reds are best for massed plantings and those beds that are viewed from a distance.

Orbits are low-growing, Sprinters spread, Ringos are early-blooming and compact, and Gremlins are dwarf. Mustang is bright red. Steady Red is a strong double-flowered seed variety.

Impatiens—Impatiens are still one of the best bets for shade. It's also one of the easiest annuals to care for. They like a moist soil and benefit from extra peat moss in the soil.

They come in many colors. It's best to plant a few complementary tones than a rainbow of many colors. They also come in different heights. Short varieties are Super Elfins, Princess and Sherbert. Medium-size are Cinderella, Novette, Shade Glow, and Futura. Tall impatiens are Blitz and Grande. Showstopper or Futura are good for hanging baskets.

Lobelia—Where summers are hot and humid, plant lobelia in partial shade. In cool areas put them in full sun. Nothing compares to the intense purple-blue of Crystal Palace that hugs the ground with dense, trailing plants smothered with flowers. Use as a ground cover, edging, or atop walls.

Marigolds—Marigolds are available in yellow, cream, copper, gold and red and in a variety of heights. The taller types are the African marigolds and often will not bloom until late summer. Dwarfer marigolds are the French. Triploid crosses produce large flowers on dwarf plants for a longer season.

Marigolds like sun, not much fertilizer, and average soil. They look neater if dead flowers are removed.

The dwarfest are Bonanza, Boy, and Janie. Next in line are the Queens(Sophia, Beatrix, and Victoria). A new series, the Incas, grows 12- to 16-inches high and has large, full flowers on compact plants. The tallest are Galore, Lady, Jubilee and Gold Coin. These may need to be staked.

Pansies—Pansies are cheerful where summers are cool or for spring and fall accents. They come in shades of purple, blue, yellow, rose and white. They like sun but not hot air. Good varieties are Crystal Bowl, Majestic Giants, and Universal.

Petunias—The number one selling class of annuals, petunias come in a wide assortment of colors and combinations. They perform all summer with full sun and pinching back. They don't mind heat or drought and do well in sandy sites.

There are basically two types: grandifloras and floribundas. Grandifloras have larger flowers but can be ruined by summer rains. Floribundas have more flowers, are more weather tolerant, and are bostrytis resistant.

For containers try the grandifloras Crockett's Victory White, Cascade, Flash, Cloud, Sail or Magic. Floribundas are better for massing in beds. A new petunia is Summer Madness. Also good are Blue Cheer, Joy, Plum, and Summer Sun.

Portulaca—Portulaca is effective as a low-growing plant where it is hot, the soil is dry, sandy or rocky, and it doesn't rain often. Sunnyside, Sunglo and Alypso produce flowers of orange, red, pink, rose, white, yellow, coral, and orchid.

Salvia—For sun and part shade, salvia provides spikes of bright red, creamy white, and intense blue for massing or accents. Use red carefully. Although salvia will tolerate drought, they do best if well-watered.

Try the Carabinieres, Red Hot Sally or St. John's Fire

for low growing types. For tall plants, choose Red Pillar, America, Bonfire, or Splendens Tall. There is a new coral salvia called Champagne, part of the wine series with Burgundy and Chablis.

Snapdragons—Choose snapdragons only if you have the labor to pinch young plants once before they flower and to remove spent flowers. If this is not done, the plants will not be compact, but spindly and won't bloom uniformly.

Colorful snapdragons come in a variety of heights, but the shorter types like Floral Carpet or Pixie would be very suitable for massed planting beds.

Spider flower—Known botanically as Cleome, this is the annual to choose where you need something tall at the back of a planting, against a fence, or to camouflage an eyesore.

Mass it together and it almost looks like a shrub. It withstands heat and drought, doesn't need staking and is relatively trouble-free. Best-known varieties are Rose Queen and White Queen.

Sweet Alyssum—A good low-maintenance annual, sweet alyssum is low-growing, spreading and especially good used informally as edging, along paving stones, in rock walls, as ground cover or as a low border. It will tolerate heat and drought and is fragrant as well. Select White Carpet of Snow, violet Royal Carpet or lavender Rosie O'Day.

Vinca—Where heat and humidity are the norm, vinca is one of the best annuals, tolerant of sun or part shade. Vinca withstands drought although it prefers to be kept moist. Foliage is glossy and crisp flowers of white or pink resist insects, pollution and heat. The Little series is well-known. Magic Carpet is a new variety with individual flowers of pink, white and rose.

Zinnia—Zinnia comes in many flower colors and shapes. It is good to solo or to mix with other flowers. Mildew is a problem, so plant in a hot, sunny spot where air cirulcation is good and keep water off the foliage as much as possible.

Good low growing types include Border Beauty Rose, Peter Pan, Pulcino, Short Stuff, Thumbelinas, and Small World Cherry. Taller varieties include Bib Top, Fruit Bowl, Ruffles and Zenith. □

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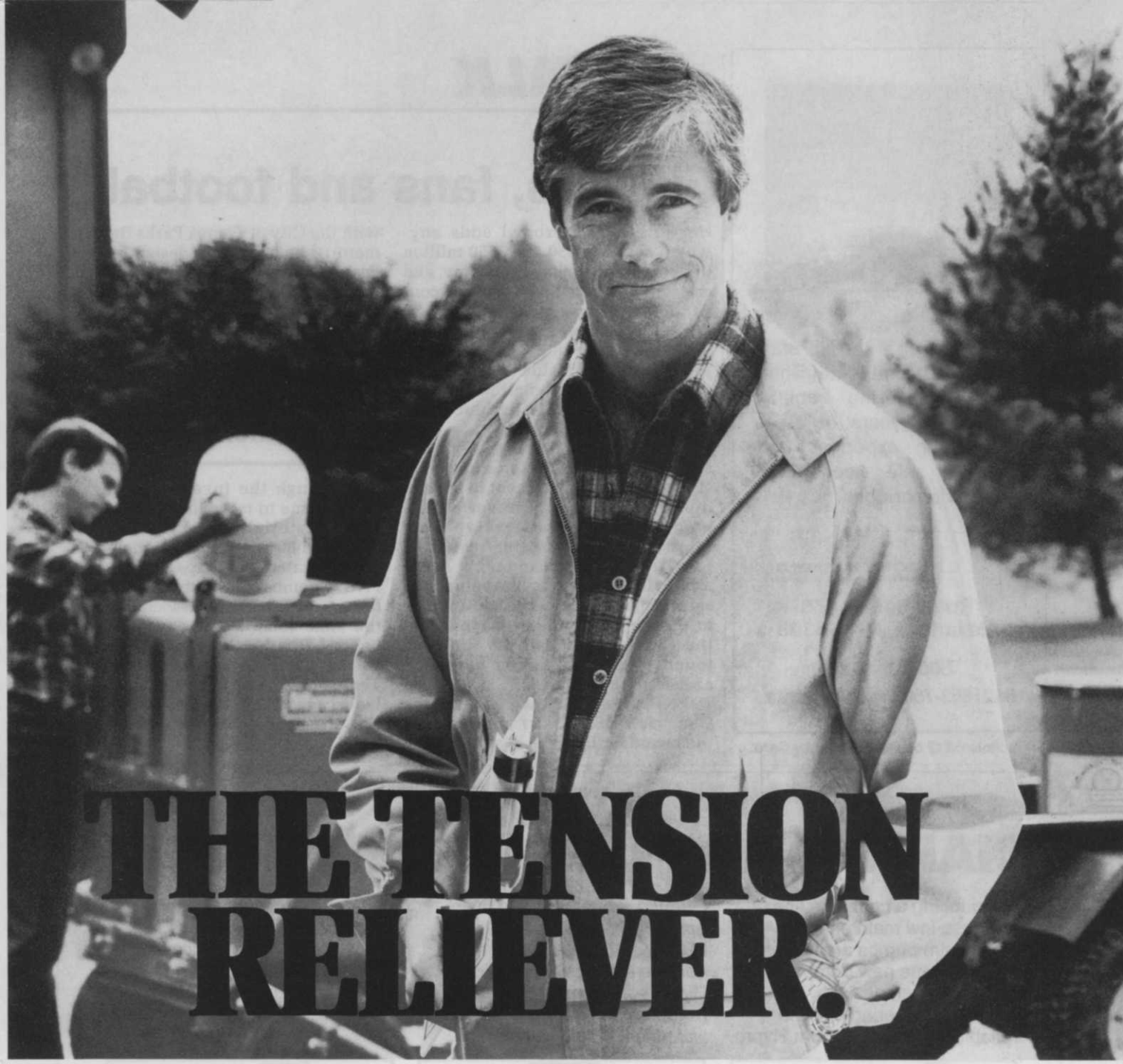

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JOBTALK

Flowers, fans and football

Hosting the Superbowl adds anywhere between $50 and $150 million to a community's local economy, and can result in more in tourism and convention activity down the road. So when the Tampa, FL, was chosen to host this year's 18th football championship, the Florida Nurserymen and Grower's Association (FNGA) chipped in to make sure gridiron fans enjoyed a pleasant visit.

Several members of the Tampa Bay chapter of the association showed up at Himes Avenue, adjacent to the stadium, one day and converted the median into an attractive horticultural display. After installing oaks, leriope, palms and other materials in late September, the volunteers returned in November to add annuals to the display. And two days before the game they added the finishing touch by placing forced blooming azaleas in the islands.

FNGA Super Bowl Committee Chairman Ron Arkay spearheaded the beautifaction project and worked with the City of Tampa Parks Department in developing a design for the island that was ultimately revised six times.

80% of the materials were donated by Tampa Bay FNGA members

Although the investment in the island came to more than $13,000 for labor, materials and irrigation, all labor and 80 percent of the materials were donated by Tampa Bay chapter FNGA members. Twenty five nursery firms and gardening associations in the area, some as far away as Hollywood, FL., donated time and energy to the project. An additional six Tampa-area companies also agreed to landscape other median islands for the city to celebtrate Super Bowl XVIII.

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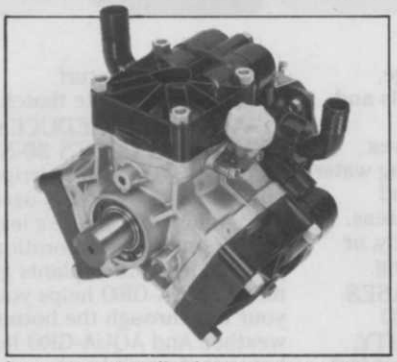

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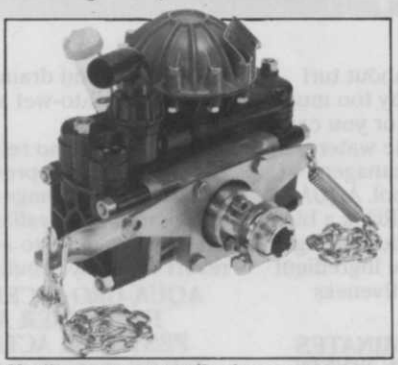

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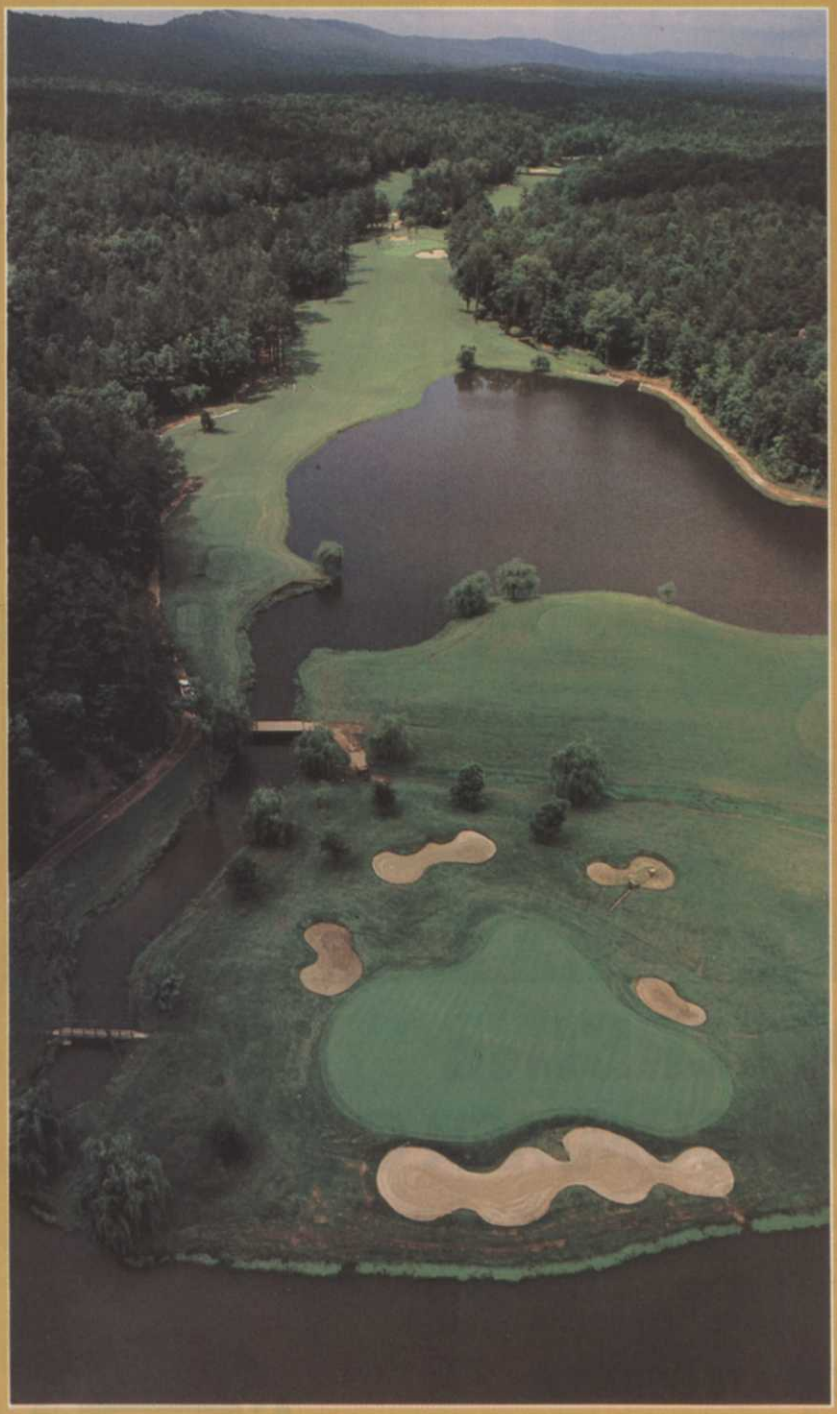

18th green at Shoal Creek, Shoal Creek, Alabama

Shoal Creek, Alabama

At the rugged Shoal Creek course, host of the 1984 PGA Championship August 16-19, 1984, the touring professionals will again be putting on Penncross creeping bentgrass. Penncross and Penneagle, the Penn Pals, are no strangers to the pros. Most of the recent major championships have been played on one or the other. The Western open at Butler was played on Penneagle fairways and greens. The 1983 US Open at Oakmont was played on Penneagle tees, fairways and greens. Maybe you saw the sixty-foot putt on Penneagle.

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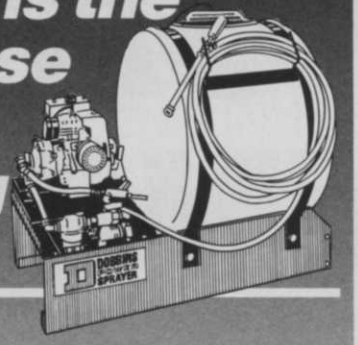

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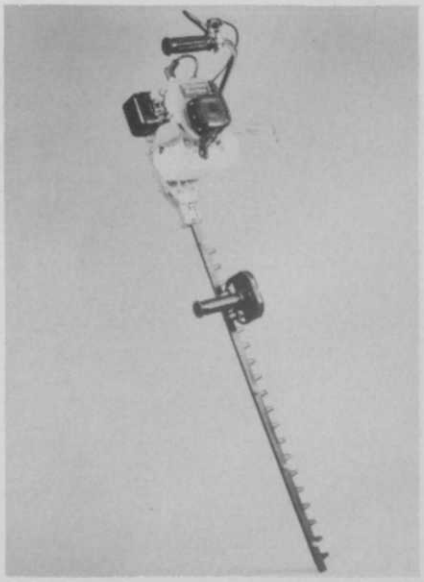

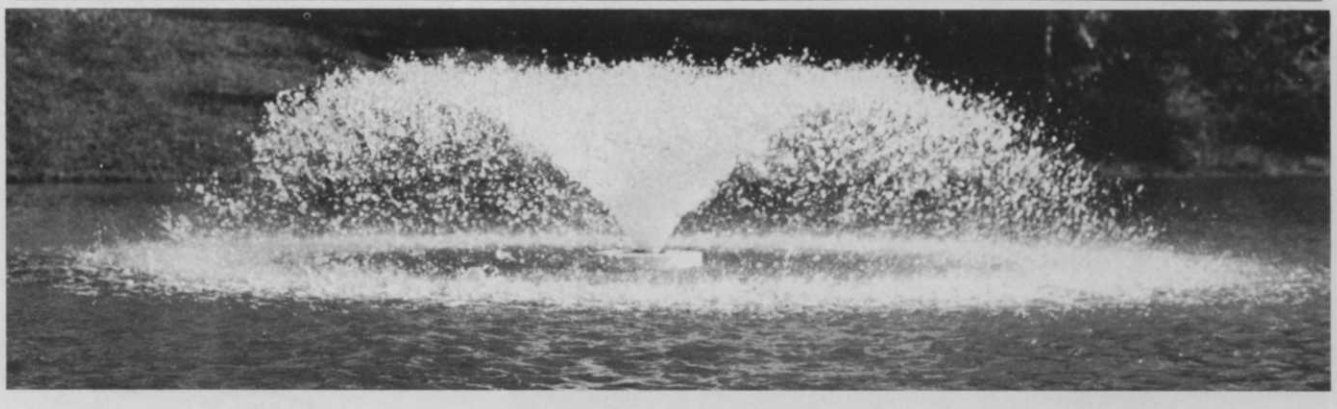

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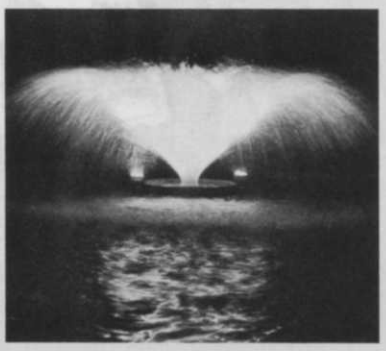

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WTT 34

Machine, incorporates a host of advancements in design that provide cleaner, faster, cutting and shaping of hedges, vines and ornamental plantings than ever before possible.

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The Green Machine Model 2400 Hedge Trimmer has a suggested retail price of $299.50 and is sold exclusively through authorized Green Machine dealers.

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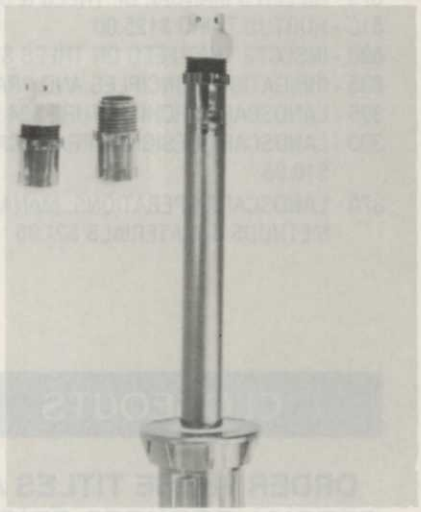

threaded mister, bubbler or shrub head. Adaptors screw directly on the stems of two through 12-inch high spray heads to increase the capabilities of most sprinkler systems by the company.

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WTT 34

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wrench use. Other sizes are equipped with standard garden hose couplings. Country Club RT is available in a full range of diameters and sizes.
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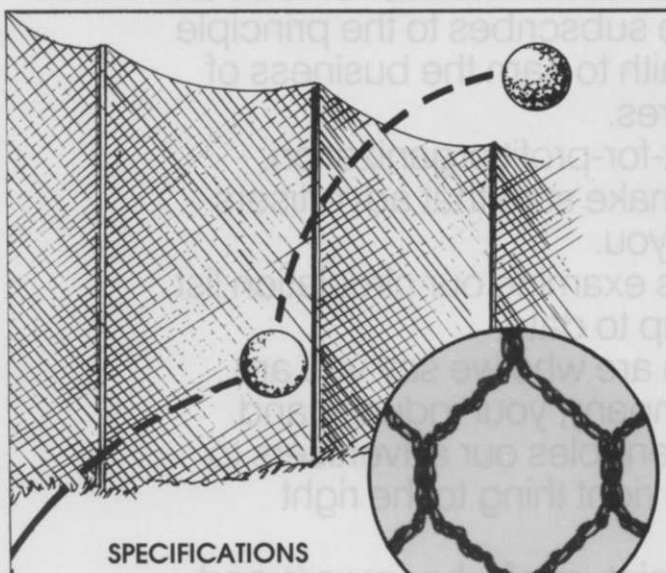
Revised BL-52 blower facilitates loading

Modifications to the BL-52 Billy Goat blower have made the machine easier to load and unload from a vehicle.

The revised BL-52 features a split



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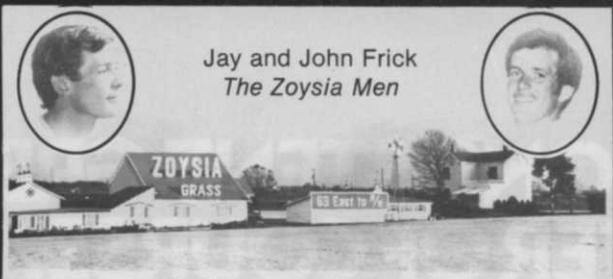

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"T" handle which allows the operator to use a dual grip when lifting the

machine. The engine of the BL-52 also has a lift handle.

The BL-52 features a 5 hp Briggs & Stratton ball-bearing, 4-cycle engine with an eight-blade aerodynamically designed fan. The blower is designed with adjustable front or side exhaust for greater maneuverability and has an easy-grip hand throttle conven-

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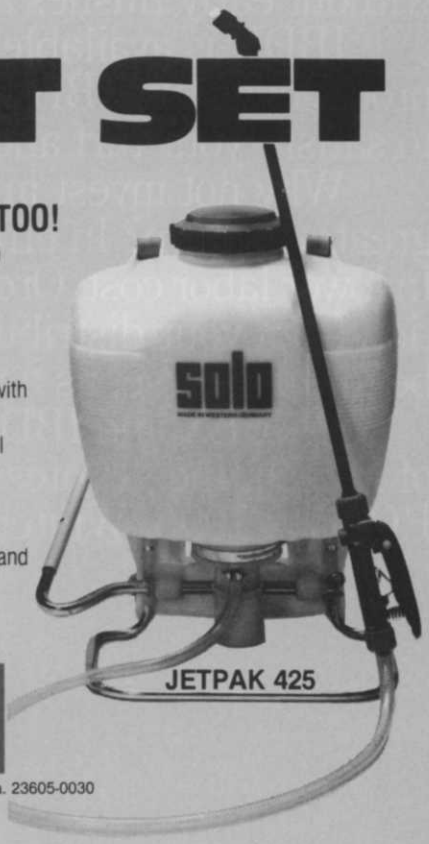

JETPAK 425

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Circle No. 190 on Reader Inquiry Card

iently located on the handle.

Ten-inch rear wheels (pneumatic tires optional) and a five inch steel front wheel permit the machine to operate smoothly on hard surfaces, turf or uneven terrain. The BL-52 has a 75 pound shipping weight and ships packed in one carton.

Billy Goat Industries manufactures a full line of industrial and turf cleaning products, including vacuums in 3.5, 5.0 and 8.0 hp and 5.0 and 8.0 hp blowers, back blowers, push sweepers and electric vacuums.

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Lightweight, compact sod cutter from Turfco

Small and sturdy makes the new, self-propelled sod cutter from Turfco, a versatile piece of sod equipment.

The Model A Turf Cutter is powered by a 3 hp industrial/commercial engine and cuts 12-inch wide and 3/4 inch thick sod at speeds up to 75-fpm. A 5 hp I/C engine and a blade for 1 1/4-inch thick cuts are available as optional items.

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The well-balanced sod cutter

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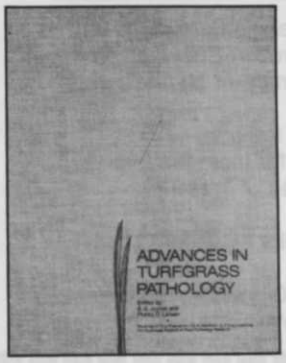

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includes a sturdy roll cage to protect it during transport and handling. With one-third fewer parts than other powered sod cutters, normal maintenance is fast, easy and simple. It's small size, along with its removable handle, allows transport in car trunk or station wagon.

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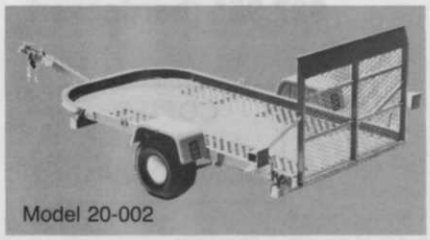
Heavy-duty power from MD600 Mobile Drill

Hoffco, Inc., traditionally-known in the power equipment industry for its

Snowco Utility Trailers
...now even more versatile!


Model 20-002

Ideal for hauling grounds maintenance equipment, ditchers and other bulky, hard-to-handle items, the proven Snowco line includes eight flatbed trailers with loading ramps or tilt decks, plus a box bed trailer with tailgate.

The design of the popular ramp loading trailers—with perforated steel decks—has been improved for increased versatility. Three models are offered with capacities of 1,150 to 4,200 pounds.

Five tilt trailers with perforated steel decks are offered with capacities of 1,000 to 3,500 pounds.

The steel box bed trailer—capacity 1,200 pounds, is available with an optional canvas or fiberglass cover.

Model 20-006

Snowco
4386 McKinley, Omaha, NE 68812

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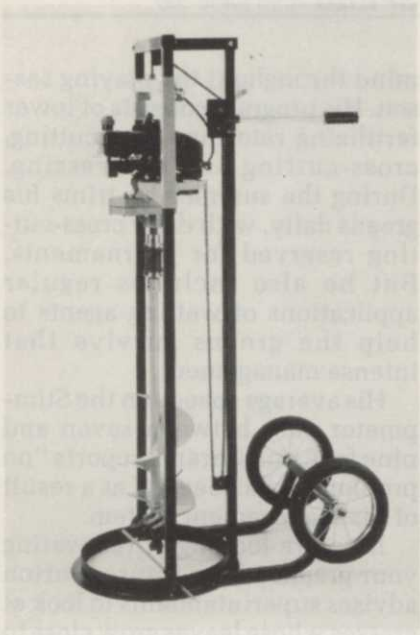

design expertise, has created a highly expandable piece of equipment, the MD600 Mobile Drill unit. It has heavy duty looks and heavy duty power, yet it moves easily over any terrain on 15 inch wheels.

An extended tubular handle with grip give control for mowing or operation. The MD600 mobile unit is a one-man operation, designed to do the work of a two-man drill.

You won't need to disassemble for transporting in a van or pickup. It's especially constructed to give ease and efficiency in disassembling and changing augers and bits. A locking mechanism holds the unit securely in place for changing augers and bits.

Hoffco's MD600 Mobile Drill unit is a natural for fertilizing trees. The two-inch or four-inch Hoffco augers are the perfect size to drill small holes needed for the fertilization process.

The manufacturer recommends its two-inch and 10 inch standard augers for digging in ordinary soil conditions. For soil such as caliche, hardpan or sandstone, the six-inch to 10-inch heavy duty auger is recommended, along with Hoffco's fast cutting Pengo bits. Another "plus" feature is a new Hoffco invention — a shock absorbing unit to relieve mechanical stress as it absorbs jolts and/or cushions damaging shock loads.

Circle No. 190 on Reader Inquiry Card

Walk, ride rotaries expand Jacobsen line

A new series of rotary mowers that operators can walk behind or ride expands the turf care line of Jacobsen Division of Textron Inc.

Named the Commercial 32, 36 or 50, for inches of swath cut, the new line is aimed at turf situations where neither smaller walk-behind nor mid-size riding rotary mowers lend themselves. The rotaries are ideal for landscape contractors, lawncare services, cemeteries, schoolyards, condos and industrial parks, roadways and similar turf areas that require a combination of high maneuverability and straight line production work.

One key design criterion in developing the new Commercial line was flexibility in customer choice. Not only is a range of cutting widths available, but the machine can also be ordered with 8, 11, 12 or 16 hp gas engines.

Height of cut adjusts from one inch to four inches in 1/2-inch increments by raising the reinforced heavy gauge deck, which includes a guard for trimming around trees.

In addition to a choice of engines, cutting widths and a trailing sulky, a grass catcher is also available to give a more formal look to landscaped areas.

Circle No. 191 on Reader Inquiry Card

Circle No. 157 on Reader Inquiry Card

EVENTS

APRIL

Fifth Annual Landscape Industry Show, April 4-6. California Landscape Contractors Association, Inc., at the Long Beach Convention Center. For more information contact CLCA, 1419 21st St., Sacramento, CA 95814, (916) 448-CLCA.

University of Florida Turfgrass Field Day and Research Update, April 6. Ft. Lauderdale, FL. For more information, contact Dr. Bruce J. Augustin, University of Florida, Agricultural Research and Education Center, 3205 S.W. College Ave., Ft. Lauderdale, FL 33314, (305) 475-8990.

To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 7500 Old Oak Boulevard, Cleveland, OH 44130.

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They apologize for not always being in when you call, but great stories are found in the field, not in the office. These pros know the only way to really cover the green industry is to get out and be a part of it. From turf test plots in Oregon to the corridors of our Nation's Capital, they're following leads, surveying markets and interviewing the landscape professionals who make our industry hum. Then, they use their years of experience to pull it all together, analyze it and present it to you in a crisp, easy-to-read and easy-to-use style. That way, you have the information you need to do your job better, faster and more effectively.

The next time you want to know something in the green industry, give them a call. If you can't reach them at the office, don't worry. They'll reach you in the pages of ***WEEDS TREES & TURF.***

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SPEED *from page 100*

mind throughout the playing season. His program consists of lower fertilizing rates and verticutting, cross-cutting and topdressing. During the summer he trims his greens daily, with daily cross-cutting reserved for tournaments. But he also includes regular applications of wetting agents to help the greens survive that intense management.

His average speeds on the Stimpmeter vary between seven and nine feet, and Caranci reports "no problems whatsoever," as a result of his management system.

If you're looking at renovating your greens in the future, Burton advises superintendents to look at grasses whose leaves grow close to the ground. As an example, he noted that Tifdwarf grasses withstand high-speed cultivation practices better than Tifgreen or 328, because the latter type has a tall-growing leaf system.

Snow said he believes the "ideal" green speed superintendents should strive for lies between 7.5 and 8.5 feet, which he called "very reasonable, and fair, and enjoyable to play without doing severe damage to the turf."

Snow said he believes the "ideal" green speed lies between 7.5 and 8.5 feet.

Doug Hawes, USGA Green Section regional director, suggests that superintendents try to find a "middle ground" between the varying opinions of course members on speed. He also recommends gradually increasing green speeds and holding the increase to no more than one foot a year so players can adjust.

With all the attention given speed factors in recent years, Hawes reminds superintendents not to overlook other factors.

"Some greens are unfair at any speed," he said. **WT&T**

LETTERS

Don't forget bromoxynil as 2,4-D substitute

In a recent Government Update column you failed to mention that bromoxynil (Brominal ME4) is a good substitute for 2,4-D in turf. Brominal ME4 is a product of Union Carbide. The turf industry sees and hears about 2,4-D and dicamba (Banvel) but apparently rarely do they receive information about bromoxynil and its use.

Union Carbide should advertise in WT&T about bromoxynil for use in turf for broadleaf weed control. The product is available to the custom applicator and chemical distributors for turf maintenance.

Rupert D. Palmer
Extension Weed Specialist
Texas Agricultural Extension Service
The Texas A&M University System
College Station, TX.

Kudos for Guide

Your October copy of Weeds Trees & Turf, contained an article on fertilizer by Roger Funk and Richard Rathjens.

I am urged to say this article is the most instructive and enlightening reader on fertilizer ever to come into my hands.

Be advised that I have been connected with the upkeep, and even design, of golf courses for many years.

However, I must say I learned more on the subject of fertilizers in Part I than I did in prior short courses in agronomy from two universities.

In my view, your magazine has advanced much in contents and display in the past two years.

George J. Pulver,
Life member of PGA and GCSAA

Proposition is "scary"

Since most of my peers in the 2,4D herbicide business are long ago retired or deceased, I feel compelled to suggest to you that the proposition to "sacrifice" 2,4D (pg. 16, Oct., 1983, Weeds Trees & Turf) to gain regulatory advantage is not only scary, but outright contradictory to the past history. Those of us who were there when the current mess with political control evolved, can attest that sacrificing DDT accomplished nothing and certainly gained no advantage for the industry.

Scientists have long ago agreed, for the most part, that banning DDT has only prohibited the American public from enjoying the advantages of its use. Oh yes, it has filled the pockets of the pseudo-environmentalists who have profiteered substantially with their activities at public expense. Oh, how we could use another Senator Everett Dirksen, for he understood the phonies and the foolish, misled public segments.

No, if you cannot defend 2,4D, then, in fact, you cannot reasonably defend any pesticide on today's market. Jerry Faulring has good intentions, I'm sure, but he apparently doesn't know much about the history of the on-going battle with lawyers and antagonists over pesticides. The "self-vested" interested parties have misled and prevailed entirely too much up to now and conceding further ground is ill-advised. 2,4D has as good and justified use record as any

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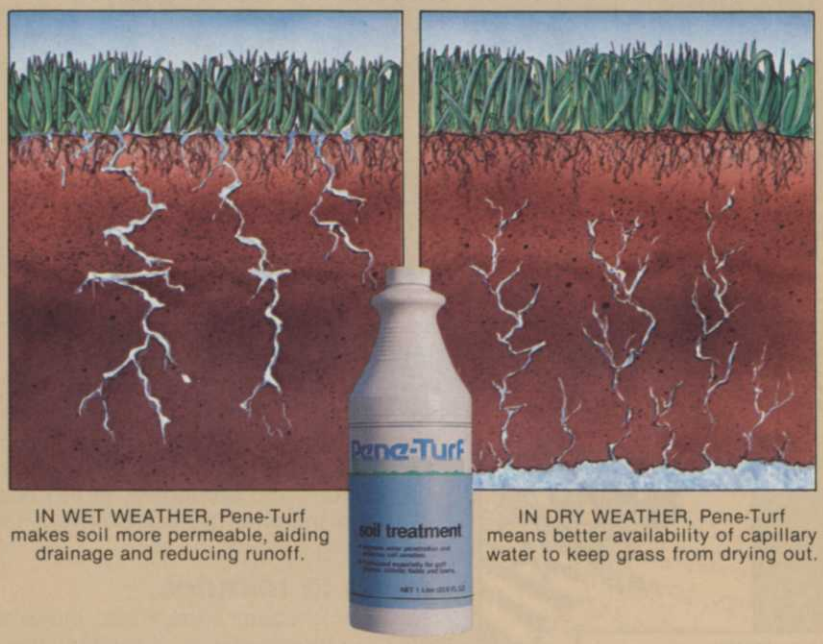

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material used today and we have no substitute after some 35 years of experience.

James O. King
Regal Chemical Co.
Alpharetta, GA

Rationale questioned

I have read with great interest (Drs. B. Rao and T. Mog, authors of "Problem Solvers") your response to the question from Missouri regarding "tree injections" in the September 1983 issue.

C.S.I. is a major supplier to the tree care industry (of systemic implants), and, as you are undoubtedly aware, a supplier to the Davey Tree Expert Co. As such, I am more sensitive to the inconsistencies and lack of rationale that is often used in discussing systemic injections and implants.

Several statements in your response that deserve attention are: 1) "Wounds of any origin are harmful to the tree and should be avoided"; 2) "The smaller the wound, the smaller the chances are of doing permanent damage to or killing the tree"; 3) "Injections/implants should be used only when established treatments fail"; and 4) "My major reservations lie with the materials being injected and the benefits attributed to the injections".

Specifically, I would like to comment on each of the above points:

1 What is your attitude toward pruning cuts and "cosmetic tree surgery"? Certainly such practices involve "wounding the tree" and the apparent benefit of such wounds would seem obvious.

2 The emphasis of "smaller wounds" often "used out of context" by commercial companies promoting devices alleging to utilize "smaller physical wounds". Also, it has been demonstrated over the past 20 years that "smaller is not always safer"...i.e. theoretically you might utilize a hypodermic needle to inject a minute quantity of a "damaging compound" that could cause extensive cambial dieback or demise of the tree. I think instead we should be examining the chemicals being introduced into the tree (and their potential risks); and equally the tolerance of different tree species to withstand such treatments rather than "imply" that 3/16 inch diameter holes are "acceptable", but 3/8 inch are "not acceptable" (note: examples only!)

3 The use of systemic treatments "only when established treatments fail" does not satisfy the applicator utilizing IPM (Integrated Pest Management); nor does it satisfy the "needs" where conventional applications are (a) not environmentally acceptable, or (b) not physically possible.

4 I am in agreement with your "major reservation" regarding chemicals being injected (or implanted). Also, in considering this aspect, we must be able to differentiate between discolored wood and deadwood! Contrary to the opinion of some plant pathologists, certain chemicals can cause discoloration without contributing to cambial dieback.

In summary, injections and implants have been available to (and utilized by) the industry for over 20 years and I believe there is a basis for a more positive response than that which was expressed in your column.

Warren D. Wolfe,
President, Creative Sales, Inc.
Fremont, NE

We welcome your comments for the letter section

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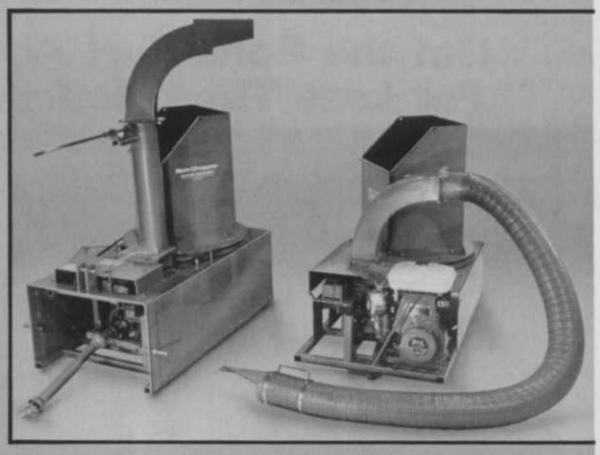

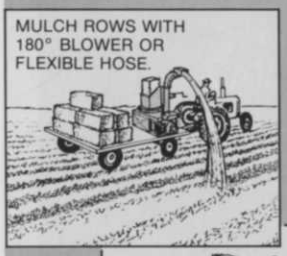

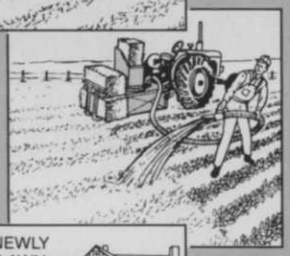

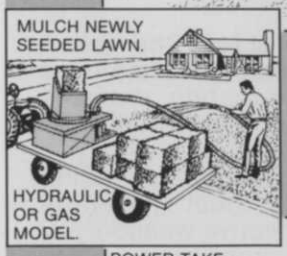

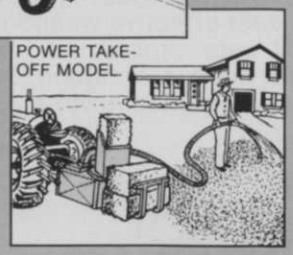

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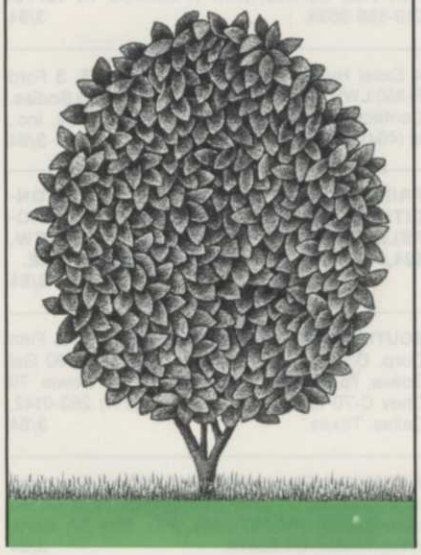

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OUTLOOK

Under the influence...

His mind exploded! Caught foolishly urinating in a customer's bushes, lawn applicator David Garabedian rushed the screaming Eileen Muldoon, strangled her, and threw three 20-pound rocks at her.

Seems unbelievable, but it happened last year and the jury made its decision this winter.

Garabedian said the insecticide he was spraying lawns with that day made him involuntarily intoxicated, and therefore temporarily insane.

A Middlesex County, Massachusetts, jury did not except his defense, convicted Garabedian of first-degree murder and he is now in a maximum security prison in Walpole.

Garabedian has been described as a big (six feet four inches) but gentle young man (23-years-old). A witness told the jury Garabedian quit high school football to avoid hitting people.

Garabedian recalls reaching out and grabbing the woman's throat, feeling her go limp, and throwing rocks at her. "He was confused, something snapped, something blew up in his head," said the defense attorney.

Legal minds at work

The manufacturer of the insecticide and the owner of Old Fox Lawn Service convinced the jury such implication of guilt was unrealistic. But, who can easily forget it happened?

The Boston Herald spread the details of the bizarre occurrence across the East Coast, the legal center of the U.S. and location of the big name law schools. The seed has been planted in the minds of many reputation-seeking young lawyers anxious to get their names in the Journal of the American Bar Association.

A message to the Green Industries

The case sends a message to the Green Industries as well. Lawn care has made the entire industry more visible. Chemicals are not fully understood or adequately respected by many users. It is imperative that every precaution is taken to protect applicators from toxic chemicals, AND to show public observers the Green Industries are careful.

Bruce F. Shank

Bruce F. Shank, executive editor

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DYRENE gives you effective control of the various species of *Helminthosporium (Drechslera)* which cause diseases known as melting-out and leaf spot.

DYRENE helps you control dollar spot, copper spot, snow mold *(Typhula)*, and rust. It can be applied easily with standard equipment. Use recommended rates and follow label directions.

DYRENE Turf fungicide. It spells *in memoriam* for *Helminthosporium.* See your turf chemicals distributor.

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Dr. Richard Hurley, Director of Research at Lofts Seed Inc., heads the company's continuous research programs which enable Lofts to maintain the enviable reputation of being a leader in the turf field with the introduction of superior, proprietary varieties.

Prelude is a product of Lofts Seed Inc. and Great Western Seed Co., Inc.

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